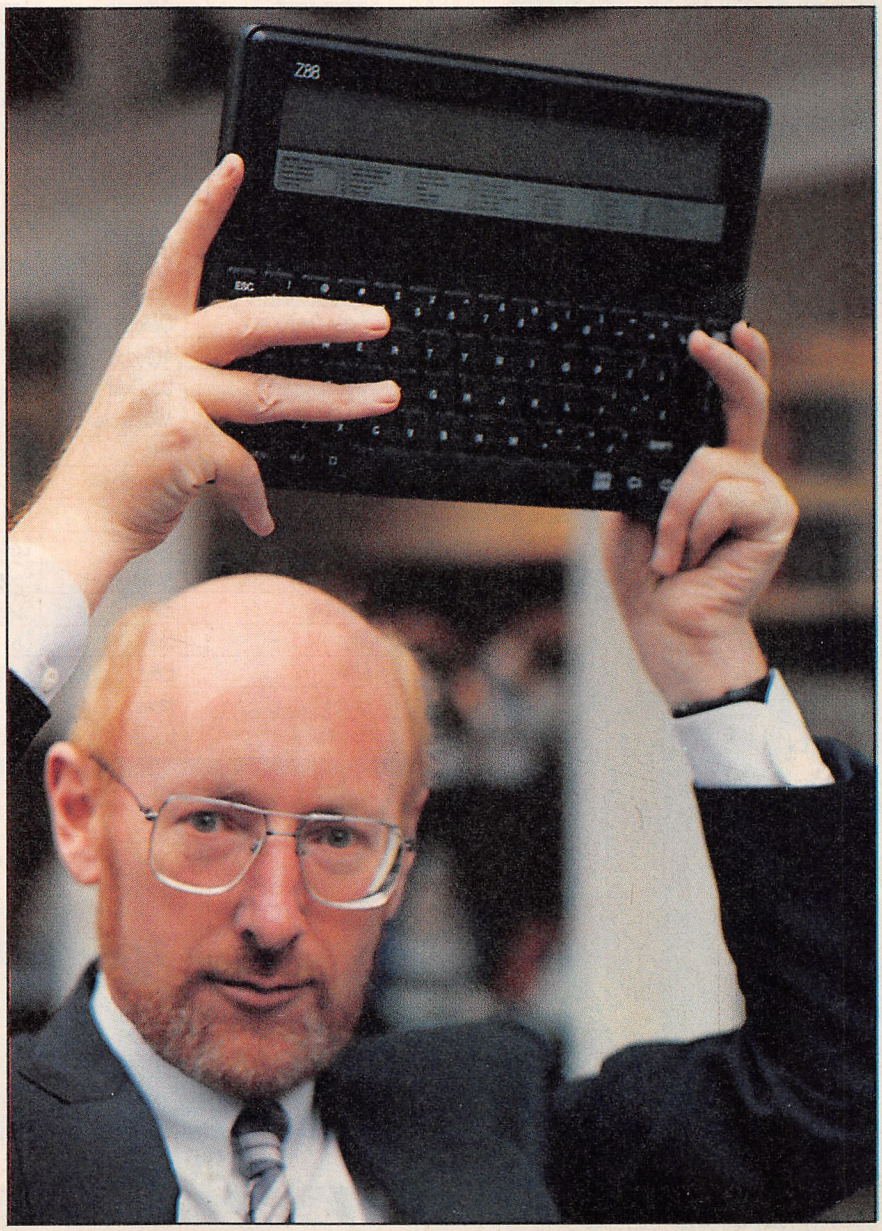
September 11–17 1987 Vol 6 No 36 60p

POPULAR Computing WEEKLY

Sir Clive Sinclair speaks out

see page 10



NEWS DESK

Amstrad price cuts revealed

Chelsea FC puts its shirt on Commodore

FEATURES

Wimps on the CPCs

Repairing your Spectrum

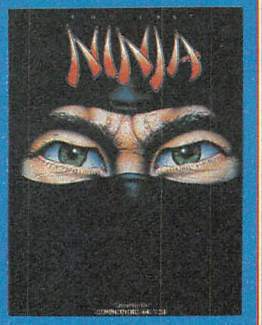
Rack-It reviewed

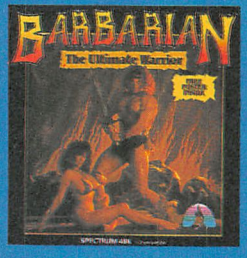
ATARI COMMODORE SPECTRUM

SPECTRUM COMMODORE AMSTRAD ATARI

AMSTRAD COMMODORE ATARI SPECTRUM

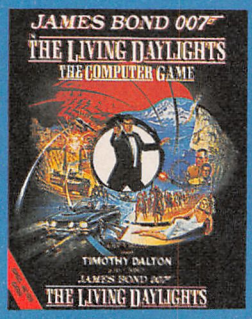
WOOLWORTHS TOP 30 COMPUTER SOFTWARE

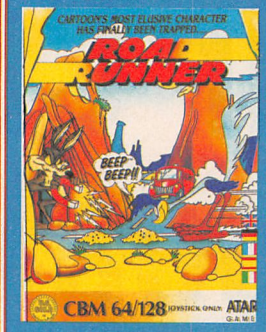


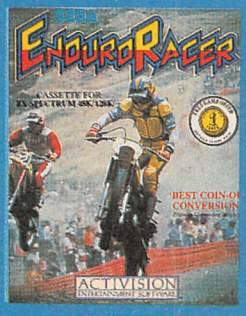


SEPTEMBER 1987

POSITION	TITLE	SOFTWARE HOUSE	MACHINE TYPE	PRICE
1.	Exolon	Hewson	Spectrum	7.99
2.	Last Ninja	System 3	C64	9.99
3.	Road Runner	U.S. Gold	Spectrum	8.99
4.	Barbarian	Palace	Spectrum	9.99
5.	Living Daylights	Domark	Spectrum	9.95
6.	Road Runner	U.S. Gold	C64	9.99
7.	Enduro Racer	Activision	Spectrum	9.99
8.	Paperboy	Elite	Amstrad	8.95
9.	Living Daylights	Domark	C64	9.95
10.	Barbarian	Palace	C64	9.99
11.	Epyxs Epics	U.S. Gold	C64	9.99
12.	Leaderboard	U.S. Gold	Spectrum	9.95
13.	Ace 2	Cascade	C64	9.99
14.	World Class Leaderboard	U.S. Gold	C64	9.95
15.	6 Pak	Elite	Spectrum	9.95
16.	Wizball	Ocean	Spectrum	7.95
17.	Game Over	Ocean	Spectrum	7.95
18.	Wonderboy	Activision	C64	9.99
19.	World Games	U.S. Gold	Spectrum	8.99
20.	F15 Strike Eagle	Microprose	Spectrum	9.95
21.	Trio	Elite	Spectrum	9.95
22.	Pirates	Microprose	C64	14.95
23.	Big 4	Durrell	C64	9.95
24.	Paperboy	Elite	C64	9.95
25.	Wonderboy	Activision	Spectrum	9.99
26.	Paperboy	Elite	Spectrum	7.95
27.	Trio	Elite	C64	9.95
28.	6 Pak	Elite	Amstrad	9.95
29.	Exolon	Hewson	C64	9.99
30.	Gauntlet	U.S. Gold	Spectrum	8.99







WOOLWORTHS

A Great Deal in Entertainment

VISA

* At selected larger stores. Mastertronic games at £1.99 and £2.99

* Items subject to availabilty

COMMODORE SPECTRUM AMSTRAD

POPULAR Computing WEEKLY

September 11–17

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31 Communications Graham Edkins returns with one of his regular round-ups of the news from Compunet. This week, he suggests two areas of the database for Commodore owners which are well worth a look.

32 Soundcheck The problems of finding an editor powerful enough to make the most out of your synthesiser – Mark Jenkins reports.

Features

13 Chess Board Martin Bryant's column this week explains how computer chess programs' ratings are decided, based on guidelines set down by the Swedish Computer Chess Association.

15 MAX New from Advanced Memory systems is *MAX*, a program for the Amstrad CPCs which gives the machine an icon-driven desktop system. Duncan Evans takes on the Wimps in his review.

16 Repairing your Spectrum If you use one of the older versions of the Spectrum, the chances are that it's in rather less than perfect condition. Rather than sending it away for repair, check our article to see if there are some renovations you can make yourself.

Programming

18 Sound Effects Kenn Garroch continues his series of advice on programming your computer's sound chip, with a guide to the procedures needed within your programs to incorporate snatches of music.

19 Listings Catacombs, the Gauntlet style game for the Spectrum, continues this week, together with the final part of ADS, the assembler/disassembler system for the Atari XL and XE range of machines. To round off this week's selection, we have Picture Conversion, an invaluable utility for the Atari ST written in Fast Basic, which will convert *Degas* or *Degas Elite* pictures to *Neochrome* format and vice versa.

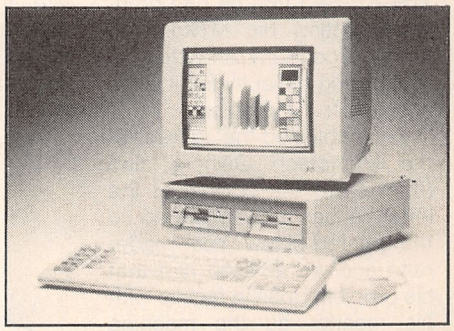
27 Bytes and Pieces Short routines for you to type in.

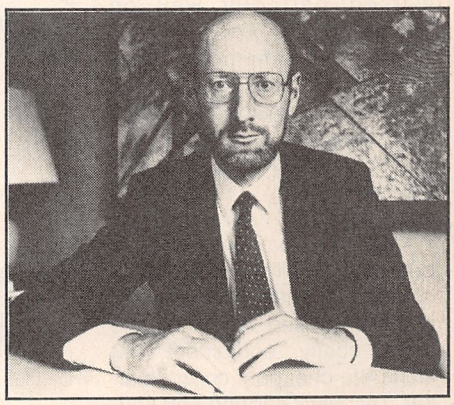
28 Peek and Poke Kenn Garroch answers your programming queries.

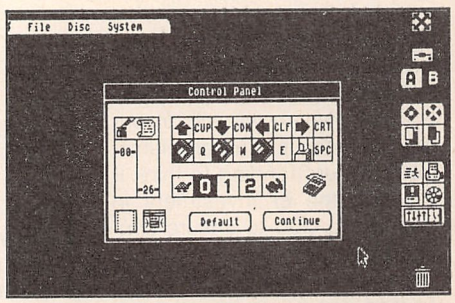
Games

41 New Releases Your complete guide to all the programs released this week, including *On the Tiles*, a feline arcade adventure from Firebird, and *Ninja Hamster* from CRL.

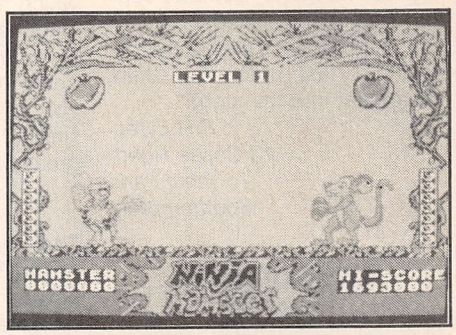
Plus, the first games from Hewson's budget label Rack-It – how do they compare to Hewson's highly respected full price games?







Top: The PC1512, due to be cut in price later this month. Above; Sir Clive Sinclair. Below: MAX, an Icon desktop system for the CPCs. Bottom: Ninja Hamster from CRL.



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ABC

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LETTERS

More Memotech assistance

A reader recently showed concern that he had problems getting his MTX512 to function correctly and that he was having difficulty finding the answers to his problem.

You published the address of the Memotech Owners club (thanks!) at the bottom of the letter. It has now changed to that printed below. Your reader rang and we advised him that his problem does in fact lie with his monitor as the machine worked perfectly well on another TV.

I have heard from Ron Gladwin of UK Home Computers, who said that you had given him a lot of trouble over this affair. I think therefore that it is best if I try and clarify our working arrangement.

UK Home Computers is in the business of selling cheap home computers, with a service that is hard to find when buying more costly equipment, let alone the cheapest on the market. Technical support and software help can not be free with a machine of this price, so queries of this nature are passed on by Ron to the Memotech Owners club, where we will do our best to listen to any problems, most owners tending to think it is worth the £7 investment in joining the club to ensure continued support.

So, for what amounts to £50, anyone can buy a cheap computer and a year's membership to a club which is dedicated to helping them. I think you must agree, that this is not a bad deal for your money!! and certainly not a group of people out to make a 'fast buck' and then disappear into the night.

P R Eyres
13 Copse Road
Townhill Park
Southampton

Tweaking the joystick

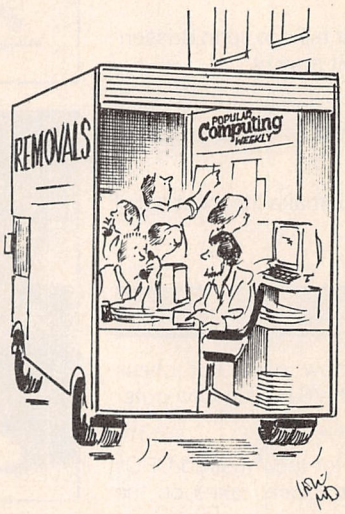
Having bought a Quickshot II Turbo joystick for my Amstrad CPCs, I returned home to find it didn't work.

When plugged into the joystick port the input given was a constant 32 (a number not usually possible with a joystick).

I returned it to the shop, thinking I had a 'dud' joystick, but that wasn't the case, since my replacement worked in exactly the same way.

I opened the joystick up and played around with some of the connections. The answer was simple – just unplug the end wire, the red one (which isn't soldered in), wrap a bit of tape around the connection to prevent it touching any part of the circuit.

Lee Barton
Runcorn



Abandoned project

I have been trying to find a software supplier for the Commodore 64 who stocks *Project Planner* and other Brainpower titles. Unfortunately, neither Triptych Publishing, which originally marketed the product, nor Collins Educational which took over from it, any longer sell Brainpower software. Do you know of anyone who does? Or, alternatively, could you recommend anything similar? Your advice would be greatly appreciated.

A J Barker
Southampton

The editor replies: Oddly enough, I actually came across the Brainpower range on sale in a service station just outside Peterborough on the A1!

Following your letter, we've made fairly extensive inquiries of wholesalers and dealers to try to track down the supply to this one shop, but to no avail.

If any wholesalers or dealers are reading this, and have *Project Planner* in stock, do let us know and we'll pass the message on.

Let's hear it for Centec

I thought I would just write to tell you about Centec Electronic Systems Ltd, of Kent.

My husband went to a computer show in London where he bought several items for himself and friends. He then purchased some discs (two packs of 25) worth roughly £20. He started on his way home only to find he'd left the discs on the counter.

When he arrived home I phoned Centec on the off chance that they may have found them. A lady said she would phone me back on Monday, which she promptly did. The discs hadn't been found, but she said they would send my husband one disc as a goodwill gesture.

Today, a pack of 25 discs arrived. I thought though this deserved some thanks, so I am writing to tell you. What a very nice gesture from Centec. They needn't have bothered need they? Well done Centec.

Mrs Duncan Dunlop
Mid-Glamorgan

Silicon implant

I would like to inform your readers of a great new fanzine called Silicon for Spectrum and C64 owners. The price is only 40p, so if anybody wants a copy they can send a cheque or postal order (along with a SAE) to the address below.

We promise same day despatch and, for the first 15 orders, a free poster.

Andrew Hall
129 Cheadle Road
Cheddleton, Nr Leek
Staffs ST13 7HN

Magic Button addenda

I'd just like to clear up a few points about my Magic Button article (*Popular,* August 21) which have arisen in some of the enquiries I have received.

The chip numbering as described, is with the chip legs pointing down and looking at it from above.

In step 3, the legs of the I.C. socket are soldered to the legs of the Rom. In step 5 it is the bent pin 27 of the socket, and not the Eprom, which is connected to pin 28.

If you want to do the compatibility mod then you need a single pole, double throw switch with the centre pole connected to the input of the 746574, and the other two connected to 280 pin 8 and the second hole up respectively.

At the moment it has only been tested on 48K versions of the Spectrum. Its effect on 128s is unknown.

I hope this clears up any misunderstanding.

Mick West
Shipley

Illogical, Captain?

What are the real reasons for software being released so late? *Star Trek,* for example.

Star Trek was shown at last year's *Personal Computer World* show. I went into a hi-fi shop in Bristol in April 1987 and played and watched people play *Star Trek* in the shop and the game was finished.

But when I phoned up the shop, I was told that it was not out yet. What's going on?

K Barlett
Bristol

To be fair to Telecomsoft, the game itself wasn't shown at last year's PCW show, but videos from the original TV series.

Star Trek's problems with release dates have been well documented in this magazine and include problems with pirate versions of the unfinished game being let loose. I doubt that the shop version *was* a finished copy – early demos had been released to the trade.

The facts about Midi

One thing that continually annoys me about the seemingly everlasting 16-BIT computer debate is the fact that no-one, as yet, has bothered to tell the average computer person or buyer what a Midi interface actually is.

Everybody says that the Amiga has Fairlight sampling, but not to worry because the Atari ST makes up for this with a Midi interface. That, to the average person, would imply that the ST can produce Amiga quality sound. Yes indeed it can, but only after you have spent at least £100 on a quality sampler. This extra £100 having

meant that you could have bought an Amiga anyway and so destroying the prices argument.

What the reviewers should have said is:

"The Atari ST has superb facilities for those with Midi instruments, the cheapest of which are usually around £200."

I wonder how many ST users are marvelling over the Midi interface without being able to afford a Midi keyboard?

Finally, I'd like to know whether the filters on the Amiga are under software control and whether it is possible to reprogram them to cut off at a higher frequency than 7.5Khz.

Giles Goddard
Southampton

The filters are hardware controlled only, I'm afraid.

In defence of Archimedes

Having just read N A Ellerby's letter in the August 21st *PCW*, I would like to offer a few comments.

Acorn is aiming the Archimedes mainly at the education sector where the machine has already been accepted by a number of local education authorities, so it is wrong to say that it will be restricted to business and specialist areas. Considerable interest has also been shown from other areas of computing, and although Acorn cannot compete with IBM's vice-like grip on the business market (can anyone?) an MS-DOS podule to run PC software is planned.

In reply to the comments made about the machine code, the complexities involved in RISC programming (which by all accounts are only superficial anyway) will be reduced substantially when various macro assemblers and other programming aids start to appear.

Basic was supplied as standard on the Archimedes to maintain upward compatibility, which is essential in schools and handy for the home user. The current range of Acornsoft languages will run under the 6502 emulator, and RISC versions of several of these, including Pascal and C, will be released within a few months.

The ARM is indisputably superior to such computers as the Amiga, PC or Mac, and in fact is so powerful that it can outstrip a DEC Vax 11/750 by a ratio of 5:1. With ready-made third party support (from ex-BBC software companies), a massive expansion capability and of course the incredible speed, the Archimedes range looks set to be a world-beater for a very long time.

I'm only seventeen years old, and there's no way I could possibly lay my hands on £900, but if I could, you know where it would go!

Andrew Moulden
N. Ireland

QZ-Net lives on Microdrive

I would like to inform your readers (especially QL and Spectrum owners) about the changes to my magazine, QZ-Net.

QZ-Net now costs £1.00 (cheque or PO to P Lavender) plus an SAE and a blank Microdrive cartridge. The next issue is now available from the address below.

QZ-Net still covers networking between the QL and Spectrum (as well as programs, articles and reviews) but it is now only available on a QL cartridge. Please package the cartridges safely to avoid returned broken cartridges.

Phillip Lavender
27 Min Y Coed
Radyr, Cardiff

Childline appeal

I am raising funds for Esther Rantzen's charity, Childline, by selling secondhand software. May I appeal through the columns of your magazine to your readers to send me any Spectrum software which they no longer use.

The money raised from the sale of games, utilities, etc, at ZX Microfairs will help to provide a year round free telephone system for children in need.

The sale of software to aid charity is not a new idea, but this may be the first time that the public have been asked to donate software as well as buy it.

May I take this opportunity of thanking in advance your readers for responding to my appeal. Software should be sent to: Software Appeal, 4 Kilmartin Lane, Carluke, Lanarkshire ML8 5RT.

William Young
(Appeal Organiser)

Boringly negative

Why are so many of the letters written to computer magazines so boringly negative.

I'm referring to those letters which usually seem to appear shortly after a new computer hits the market. They take the form: "My Superclone BUM/PC is far better than every other machine on sale and especially those Twin-Commode Amigoes /Unicorn Architects/STs that everybody else has bought".

This type of letter has recently contaminated the letters page of this magazine to such an extent, that some sort of health warning to the effect that reading this letters page can seriously make you sick should be published at the top of the page.

Perhaps the writers of such letters suffer from some psycho-neurotic hang-ups.

Surely the purpose of a magazine letters page is to provide feedback to the editorial staff and to provide a sounding board for ideas and problems.

Not to carry out petty, childish and in some cases vindictive, arguments about the merits and demerits of various computers, which are all the more ridiculous when you consider that the majority of the writers probably use their computer to less than 10% of the machine's true potential.

W G Jones
Gwent

Your perception of a magazine letters page sounds like an editor's dream, but in actual fact, a letters page is simply a representative selection of letters sent by readers, and it can't very well be anything else.

Besides, debates about the merits and demerits of machines, particularly in the 16-bit area where so many people are looking to upgrade, can be informative and useful, rather than "boringly negative".

We're sorry but *Popular Computing Weekly* cannot guarantee to reply to *all* letters requesting a personal answer. It helps us enormously if readers are prepared to have general queries answered on these pages, so, if possible, please do not send SAEs.

Colossus on counter attack

Back to Game Two this week, where at move 25, the readers, playing white, have elected to revert to attacking Black's weak pawn on d6.

However, they've also given *Colossus* time for some counter play with its queen moving to b6.

A free vote

How do you think the readers team should respond now?

Send your suggested move to *either* Inter-Mediates (*Popular* Chess), Freepost, Sawbridgeworth, Herts CM21 9YA (no stamp needed) *or Popular* Chess, Unit 2, The Maltings, Sawbridgeworth, Herts CM21 0PG (with a stamp).

Only one vote per person please, and all entries must reach either address by Wednesday, September 16.

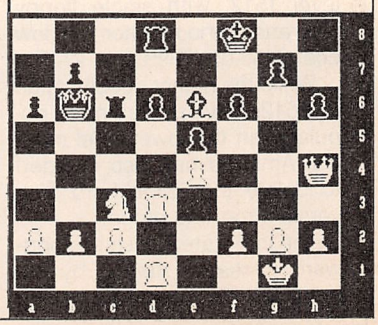
The move which gets the most votes will be entered into the game. Results and *Colossus's* response will be published in two weeks time.

Next week we return to Game One, where the readers are playing black.

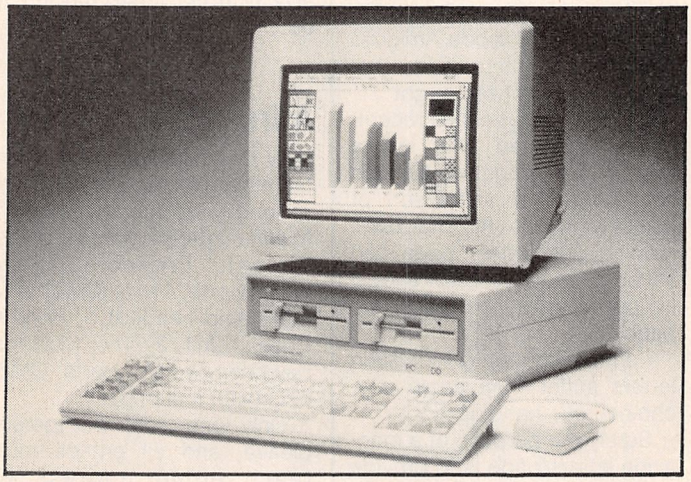
Game Two

The moves so far:

1 Pc2-c4	PC7-c5
2 Ng1-13	Nb8-c6
3 Pd2-d4	Pc5xd4
4 Nf3xd4	Pe7-e5
5 Nd4-b5	Pa7 a6
6 Nb5 d6	Bf8xd6
7 Od1xd6	Od8-l8
8 Qd6-d1	Ng8-e7
9 Nbf-c3	Pd7 d6
10 Bc1-e3	KeB-g8 o-o
11 Bf1-e2	Bc8-d7
12 Ke1-gf o-o	Bf8-C8
13 Od1-d2	Nc6-d4
14 Hal df	Nd4xe2+
15 Nc3-e2	Rc8-c6
16 Be3-g5	Qf6-e6
17 Bg5xe7	Qe6xe7
18 Ne2-c3	Bd7-e6
19 Rft-ef	Qe7-c7
20 Ref-e3	Rf8-c8
21 Re3-d3	Rc8-d8
22 Rd3-g3	Kg8-f8
23 Qd2-g5	Pf7-f6
24 Qg5-h4	Ph7-h6
25 Rg3-d3	Qc7-b6
26 ?	



Bumper price cuts on Amstrad's machines



The 1512: back to its original price

THE projected price cuts and new bundles on Amstrad's computer range (see *Popular Computing Weekly,* August 28) are official.

The PC1512 series, the PCW machines and the Spectrum Plus 3 will all be reduced in price with effect from September 23, the first day of the Personal Computer World show.

The previously announced price of £249 for the Spectrum Plus 3 has been widely criticised as uncompetitive, particularly when compared to £299 for the Atari 520STFM and the current £100 off voucher scheme on Commodore's Amiga 500.

Amstrad has now dropped the price to the trade, indicating a new retail price of £199 to the customer.

The PC1512s will each be cut by £50 – which brings their prices back to their original level at launch last year. The entry level 1512, with single floppy disc and mono monitor will now cost £458.85 (£399 plus VAT).

While the higher specification PC1512s have proved more popular than the lower level models, Amstrad has also decided to delete the 20Mb hard disc version from the range.

The integrated business software package, *Ability,* by Migent, will be bundled with the machines, as well as four US Gold titles: *Bruce Lee, Tag Wrestling, Dambusters* and *Psi-5 Trading Company.* Amstrad hopes that this move will place the 1512s firmly in the home market, and guide business users more clearly towards its new PC1640 range.

The PCW machines, the 8256 and 8512, will have their prices cut to make room for the forthcoming PCW9512.

The single disc drive, 258K Ram 8256 model looks set to retail – inclusive of VAT – at £343.85 (from £458.85), while the dual disc, 512K 8512 will come down to £458.85.

This means that the new 9512 will be slotted into the series at the VAT inclusive price of £573.85. The 9512, which has already been launched in the US, will get its first British airing at the *PCW* show and will go on sale immediately afterwards. The machine features an improved keyboard and display, and a daisywheel printer.

New machines have also been announced in the PC 1640 range, so that almost all possible permutations of colour or mono monitors, single/twin floppy or hard discs will be available.

Lastly on the new hardware front comes the DMP LQ3500, a 24-pin dot matrix printer with letter quality (60cps) and draft (160cps) modes, which will cost £399.

● Amstrad has also announced that it has acquired the US distribution company Vidco for around $7.5 million (about £5 million).

Vidco is Amstrad's sole distributor in the States – the company having moved to Vidco from the retail giant Sear earlier this year.

Like most British computer companies, Amstrad has found the going tough in the US market, with the 1512s, PCWs and CPCs failing to achieve major penetration of the market.

Commenting on the acquisition, Amstrad chairman Alan Sugar, said, "This will give Vidco the means to become highly competitive and at the same time have the resources to capitalise on the market's potential.

"We have learnt that the US market is very competitive and frankly there seems no room for a middle-man distributor, something which our friends Dixons/Silo would never tolerate."

Popular moves to new offices

POPULAR Computing Weekly is moving next week. It has been bought, along with its sister magazine *ST Update,* by Focus Magazines, publisher of *Your Computer, Putting Your Amstrad To Work, Which PC?* and *QL World*, among others.

The titles will be moving to Focus's offices in London SW1 from September 14, and *Popular* editor Christina Erskine was quick to assure readers that the magazines will still appear in their present form, but with some improvements.

Christina Erskine: "a good opportunity for *Popular's* expansion"

"We are looking forward to a prosperous relationship with the new company," she said last week. "It's a good opportunity for *Popular Computing Weekly* to expand and provide the readers with a bigger and even better magazine."

Focus group publisher Paul Coster is pleased with the move. "*Popular Computing Weekly* and *ST Update* will fit comfortably amongst our other titles," he said.

"The high regard in which the titles are held will help us to not only confirm our position as one of the fastest growing magazine publishers in the UK but will also give us a uniquely comprehensive coverage of the whole computer market."

From Monday, September 14, *Popular Computing Weekly* can be contacted at Focus Magazines, Greencoat House, Francis Street, London SW1P 1DG, telephone 01-834 1717.

CBM in soccer sponsor deal

COMMODORE UK has announced a shirt advertising deal with first division football team Chelsea, worth £1.25 million to the club.

Commodore's name and logo will be featured prominently on the Chelsea team shirts for the next three years according to the terms of the contract.

Commodore UK has been interested in sponsorship involvement in the English football league for some time. It had expressed a wish to promote the Full Members Cup, as well as being linked with the possibility of full league sponsorship, when *Today* newspaper pulled out of its contract.

Commodore Germany already sponsors Bayern Munich, and has a similar contract with the Russian team Dynamo Kiev for its matches played in Europe.

The Chelsea contract follows Commodore's active promotion of the first professional round Britain cycling race. Its new UK managing director Steve Franklin is a keen sportsman, and its sport sponsorship activities may not end here.

Amiga Wordperfect ready

TOP-selling PC wordprocessing package *Wordperfect* is now available on the Amiga – and costs £40 less than originally announced.

Wordperfect, from Surrey-based Sentinel Software, is a sophisticated wordprocessor previously available for PC compatibles, which includes a 115,000 word dictionary and full thesaurus. Other features include multiple pull down menus and mailmerge.

"Commodore is a logical next step, because the specification and pricing of the latest Amiga models make them an attractive choice for home as well as small business users," said Sentinel Software managing director Peter Fergusson.

Wordperfect costs £300 inclusive from Sentinel Software, Wellington House, New Zealand Avenue, Walton-on-Thames, Surrey KT12 1PY, telephone (0932) 231164.

Z88 now in the shops

SIR Clive Sinclair hosted the official 'Official Launch' for the Cambridge Computer Z88 last week, as the machine entered branches of Comet and Dixons.

The occasion also marked the announcement of a major maufacturing deal with the UK subsidiary of US computer firm SCI UK Limited.

Under the agreement SCI, which last year had a turnover of $470 million (about £290 million), will produce the Z88 at its plant at Irvine, on the west coast of Scotland. SCI manufactures computer equipment on a contract basis for a number of major firms, including DEC and ICL.

Meanwhile, also speaking at the launch was none other than Lalla Ward, formerly of BBC TV's *Doctor Who*. Her connection with Cambridge Computer was unclear, except that she had bought a Z88 by mail order.

"I love it," she said. "It's the computer for me."

For more on the Z88 see the Sir Clive Sinclair interview on page 11.

SOFTWARE HOTLINES

Firebird is responding to increasing competition in the budget market by starting up its second budget label. The £2.99 range will be 'slightly more up market' than the existing £1.99 label, and the first releases are planned for release within the next couple of weeks.

Car Wars is a futuristic racing game for the Spectrum that also includes a track constructor so that you can design your own racing tracks. *Hyper Blob,* on the C64, is an arcade game featuring the Blobpods (try saying that after a couple of pints) – cute little sprite thingies which have to be guided across a series of booby-trapped landscapes.

The most interesting release on the new label sounds like Ubik's *Music* – a budget polyphonic sequencer program that allows you to do all sorts of complicated things with the C64's sound chip. If it lives up to Firebird's claims then it should be an excellent buy for the price.

Hewson has, of course, also joined in on the budget game, and its next Rack-It release is the Amstrad conversion of *Uridium* (I can see CPC owners rubbing their mitts together even now).

Uridium will be turning up on the ST as well, and is currently being converted by top US software house Mindscape for release in the States (Hewson will sell it itself over here).

Ranarama is also being converted for the ST, whilst the C64 and Spectrum will be getting *Morpheus* (pictured below) and *Magnatron*, which continue Hewson's line of super-slick shoot 'em ups.

Evening Star, on the other hand, far from being a destroy-everything-in-sight type of game, is a leisurely trip along the Somerset and Dorset railway line. This is a follow up to the surprisingly successful *Southern Belle* locomotive simulation. It seems that the trip from Bath to Bournemouth is a real humdinger (if you're into that sort of thing).

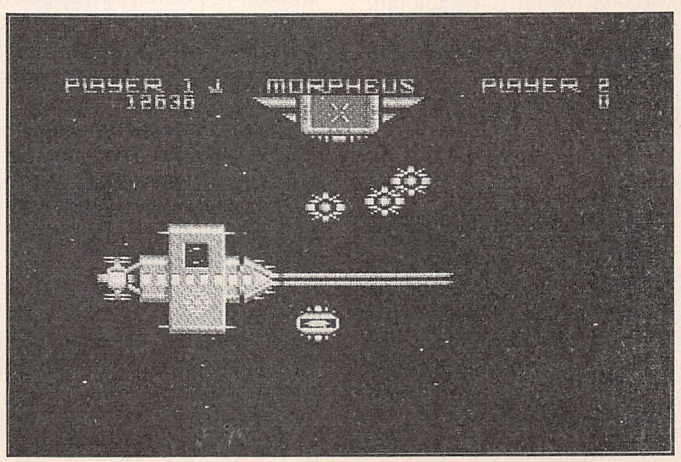
Still, it's nice to see something other than shoot 'em ups and coin-op conversions being churned out. Let's hope sales continue to make it worthwhile.

Sick bags at the ready for the next **Infocom** release, via **Activision.** Its next adventure, *Plundered Hearts,* is heading into Mills and Boon territory.

The plot sounds a little like the film *Romancing the Stone,* with you playing the equivalent of Kathleen Turner. As the heroine of the piece you set off across the high seas to be with your father, who is about to kick the bucket in a big way. But in your way stand deadly crocodiles, rocky reefs, and the handsome, enigmatic figure of Nicholas Jamison, the hunky pirate captain. "When you are in his arms you are apt to forget your mission," it says here.

Sticking with adventures, **Level 9** has got a new one up their sleeve. *Gnome Ranger* is the tale of one Ingrid Bottomlow who gets zapped by a faulty teleport scroll and has to find her way home again. The game will have digitised pictures on all disc versions, and a new feature is the 'multi-player puzzle' which requires cooperation between characters.

Cliff Joseph



DIARY DATES

SEPTEMBER

12 September
North-West England Dragon Show & Convention
Bishop Henshaw Upper School, Thornham, Rochdale
Details: Software, demonstrations, clinic etc
Price: £1.50, £1.00
Organiser: Pulser Software (0706) 849189

23–27 September
Personal Computer World Show
Olympia, London
Details: Latest hardware, software and peripherals for business and leisure computing
Price: £3, £2 – (parties over 10)
Organiser: Montbuild 01-486 1951

OCTOBER

15–17 October
Desktop Publishing Show
Business Design Centre, London
Details: Demonstrations of latest hardware and peripherals, plus seminars and user clinics
Organiser: Database Exhibitions, 061-456 8383

NOVEMBER

14 November
National Einstein Exhibition
National Motorcycle Museum, Birmingham
Details: Einstein software etc.
Price: 50p
Organiser: UKEUG (0473) 49507

Prices, dates and venues of shows can vary, and you are therefore strongly advised to check with the show organiser before attending. We cannot accept responsibility for any alterations to show arrangements.

Computer 'forgery' loophole to be closed?

A LOOPHOLE in Britain's forgery laws nearly let two multi-million pound computer robbers off scot free last week.

Angelo Lamberti, 25, and John Filinski, 23, both of north London, were jailed for three years and 18 months respectively by an Old Bailey judge last week – but only after the forgery charge to which they had pleaded guilty had to be quashed.

A recent case in which a similar charge against Prestel hackers Steve Gold and Robert Schifreen was overturned by the Court of Appeal set a legal precedent, and means that, for the moment, certain acts of forgery involving computers are legal.

So Judge Kenneth Machin QC had to quash the guilty verdict against Lamberti and Filinski at the last minute. This means that the Crown may go to the Court of Appeal to have this area of the law reviewed by the Attorney General Sir Patrick Mayhew.

In the meantime the two were eventually convicted on a charge of conspiracy to defraud – any other charges were outside the Crown's jurisdiction, since the theft effectively took place outside the UK.

The north London pair had used a Texas Instruments Silent 700 home computer, with built in modem, to access the secret codes of Lamberti's employers, Prudential Basche Securities.

Once inside, the plan was to transfer £5 million pounds worth of Euro bonds to an account in Switzerland controlled by the international band of swindlers to which the pair belonged.

Seven days is needed to complete such transfers. But it took Prudential Basche five days to put a stop to the theft – leaving only 48 hours before it would have been too late.

The Director of Public Prosecutions is understood to have thought of buying a home computer himself, when he discovered how easy such thefts are to organise.

Integrated 7 – upgraded version out

RICHARD Bielby's Neric Automation has announced two new PC software products, an enhanced version of *Integrated 7* and *Desk Commando*.

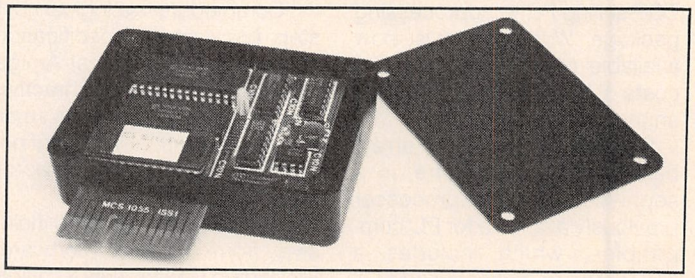
The new version of *Integrated 7* features *The Twin* spreadsheet, which, claims Neric, has the look and feel of *Lotus 1-2-3*. *The Twin* was written in C, and so Neric anticipate being able to make regular additions to the program.

Integrated 7 also features a graphics component, word-processor, relational database, Dec VT100, VT52 and IBM 3101 terminal emulation protocols and a communications component which supports the XModem protocol and Hayes-compatible modems. It can also be used to communicate with Telecom Gold.

Desk Commando features a menu driven, user selected program library and a utility suite, including calendar/appointment book, Rolodex address card file or database, auto-dialer, and a full screen virtual memory text editor.

Desk Commando requires IBM PC, XT, AT or PC compatible with at least 192K of main memory and one disc drive, and MS DOS 2.00 or higher. It costs £30 including VAT.

Integrated 7 costs £118 including VAT, and both packages can be obtained from Neric Automation, Gunsell Lodge, Wood Lane, Tugby, Leicestershire LE7 9WE, telephone (0533) 783399/783323.



Rom help for QL users

QL USERS who often use more than one Rom unit will welcome a new switching device from Micro Control Systems (MCS) of Sandiacre, Nottingham.

Multi-Rom is a 16K Ram cartridge which allows images of several different Rom cartridges to be easily swopped in and out.

MCS also claims that *Multi-Rom* is ideal for anyone wishing to develop Rom-based software for the QL, since it allows code to be downloaded quickly without blowing Eproms.

Multi-Rom is available, price £58 including VAT, from MCS. Telephone (0602) 391204 for further information.

Sir Clive Sinclair speaks out – p10

REBEL

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Clive is

Sir Clive Sinclair has never been very far from the headlines since the launch of the ZX80. Now, after last year's sale of the Spectrum and QL rights to Amstrad, he's back with the favourably received Z88 – and other products, as John Brissenden discovered, in our interview.

THE history of Sir Clive Sinclair's involvement in the UK computer industry has been one of pinnacles and troughs (and not an awful lot in-between).

From being the architect of British interest in home computing, we have seen the sad tale of the C5 electric vehicle, last year's sale of Sinclair to Amstrad and the lengthy and acrimonious saga preceding the arrival of the Z88. It all put Sir Clive Sinclair's public image at something of a low point.

However, the appearance of the Z88 portable in the shops this month marks the return of Sinclair from the wilderness, and the beginning of his attempt to reclaim a position among the computer industry's leaders.

The Z88 is here, and has garnered favourable reviews from many quarters. In price/performance terms the tiny machine looks like a potential winner.

Sinclair himself has always held the concept of portability – and miniaturisation – close to his heart. He is confident that the Z88 is right for the market, and Cambridge Computer is currently producing 1000 per week. That figure will shortly double.

So can we expect further developments in this area shortly, maybe even a Z89 or Z90?

"The thing about the Z88 is the way we've designed it, of course. It can go on being expanded pretty well indefinitely," he says.

"So obviously there's no need to change the machine, because we just plug in different cartridges and expand it. In terms of portables, that's our statement for a long time to come, I think it's not the sort of product that needs changing."

Sir Clive admits to being unsure exactly how big the market for the Z88 will be: "We know that there's a reasonable market, because we can already

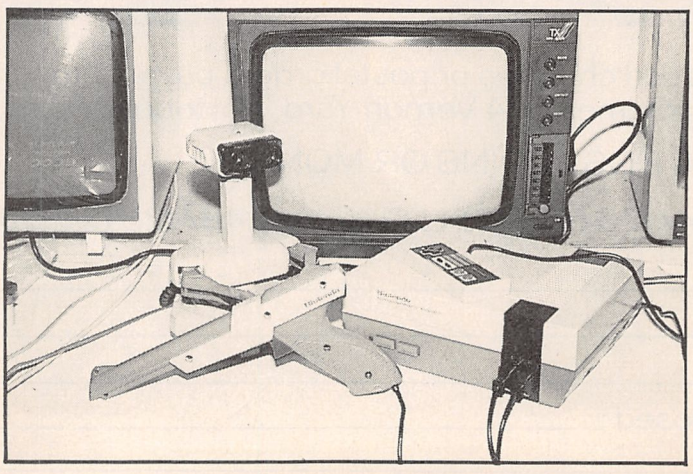
NEXT WEEK

Gold's Go! label takes on Nintendo

US GOLD is moving into the hardware field for the first time with the announcement of a distribution deal for the Nintendo games console.

The console, marketed in this country by toy manufacturers Mattel, will be distributed under the new Go! label. Go! was originally set up for a series of coin-op games conversions.

However, a US Gold spokesman told *Popular*: "We do have strong links with Mattel because we've licensed games from some of their products. When talking to them this deal just mushroomed from there."



Being the country's largest software distributor allows US Gold to provide a 24-hour service into Mattel's 900 outlets without the need for retailers to pile up large stocks of the machine.

In the near future Go! will also be handling add-on hardware for the consoles as well as looking into the possibility of distributing "other electronic consumer durables".

However, US Gold claims that its plans do not include following Mastertronic into the arcades with their own coin-op machines, nor will it be producing any software for the games console since Nintendo operates a more or less closed shop on licensing.

"You won't see any cartridge software from US Gold," said the spokesman firmly.

The PCW show cometh

The PCW show is the computer industry's showpiece event. All the big companies – and the vast majority of the smaller ones – will be there to exhibit their autumn and Christmas products.

If you're planning a trip to London's Olympia in two weeks' time for the show, or if you're simply wondering what all the fuss is about, take a look at the first of *Popular*'s special previews.

We'll give you the low-down on which new products to look out for.

KX-P1083 printer

Hot on the heels of the bottom of the range 1081, which we reviewed a few weeks back, comes Panasonic's 9-pin dot matrix 1083 model.

back in business

see that, but what the potential size of the market is, we can't tell. Obviously we hope, we think it's huge, that's why we've done it, but we can't tell."

But he is steadfast when questioned about the adverse publicity he received over the three-month delays in the despatch of the machine to mail order customers, and the runins with the Advertising Standards Authority.

"The criticism came from people who weren't the customers, that was the irony. We never said that it was going to be available in 28 days, because it wasn't. We just said if people were prepared to be one of the first, that's the way to be first and those people who wanted to be first were.

"All the criticism was artificial, because it wasn't as if we were making anybody unhappy. We were only making the ASA unhappy apparently," he says with not a little hesitation. But Sir Clive says he wouldn't do things the same way again, simply to avoid being censured by the ASA.

"But equally, we didn't do anything wrong, and our customers are very happy," he says.

Sinclair might have done all he wants to with portables for the time being, but he is nevertheless involved in other computer-orientated projects.

"The area that we're looking at is very high performance machines. The technology that we've been building up over the years is towards that area, because we anticipate that this will be needed in all sections of computing. What I'm thinking of now is high-performance desktop personal computers."

Wafer chip

Then there is the wafer chip, being developed as an ultra-fast access hard disc replacement by Anamartic. Recent, unconfirmed reports suggested that Sir Clive had finally won the £4 million needed to bring the project – currently at prototype stage – to market.

Sir Clive clarifies the situation. "The position is that that is broadly what's happening, and we're expecting to have an agreement signed in about three weeks' time.

"The first product will be a 20Mb wafer, and that will be built into various products. There'll be black boxes that will contain anything from one upwards of these wafers," he says.

"What Anamartic is going to be selling is not replacements for hard discs, because it does a lot more than a hard disc, but a sort of ultra-fast access hard disc.

"Sinclair Research is interested in building wafers into computers, so that they can increase their performance, and obviously we will be doing that as early as we can. The earliest we can see wafers being in production is late-ish next year, so that sets the beginning."

Another company with the Clive connection is Shaye Communications, which has a 25 per cent stake in a new pocket telephone project being developed with Timex, Fred Olsen and the Finnish company Nokia-Mobira, the world's largest producer of cellular radio. Sir Clive reckons we should see the pocket phone sometime next year.

Pushbikes

One thing we definitely won't see is a successor to the disastrous C5 electric vehicle, launched in 1985. Last reports said that C5 parts had been bought up and fitted to pushbikes.

"The C5 was meant to be a stepping stone, because what we really wanted to do was produce a full range electric car. We had a design for an 80 mile-per-hour 300 mile range, electric vehicle, which we conducted a complete design study on.

"The C5 was meant to come in the next generation, but of course it got a bad press, and it didn't turn out to be the success we hoped, and so that fell by the wayside."

Sir Clive occupies a unique position in the UK computer world, and there is more to know from him than the next six months' product schedule. What, for example, is his view of the much-touted shift to 16-bit machines which is occupying many people's attention at the moment?

"I think, funnily enough, that the 16-bit machines were and are a mistake. We were the pioneers in that field, when we came out with the QL long before Commodore and Atari came out with their 16-bit machines, and the irony is that really the 16-bit machines are not doing anything that the 8-bits couldn't have done," he says. Surely several thousand Amiga and ST owners, at the very least, would beg to differ?

"There's nothing wrong with the Atari ST, I'm not knocking the machine. The Atari ST is a super machine. The point I'm making is that it's not super because it's a 16-bit machine, it's just a nice machine.

"You certainly don't need 16-bits for games, because if you look at all the games, people who put out games for the 16-bit machines, put them out for the 8-bit machines as well. You could say the Amiga has got super graphics. It has, but not because it's a 16-bit machine, but because it's got a blitter chip in it, so there's the super graphics," he says. Sir Clive went on to hint that he's more excited by the prospect of 32-bit micros.

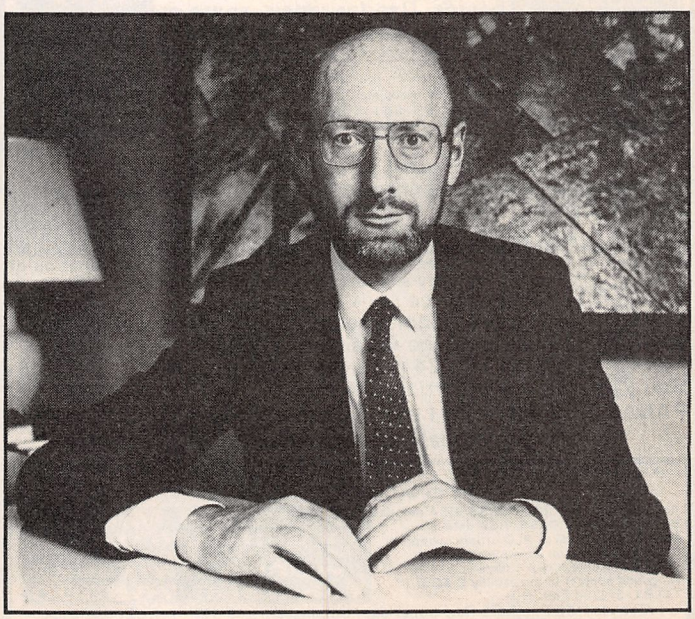
Talking of which, what of Acorn's RISC-based Archimedes? It has had publicity this summer, with everybody marvelling at its speed. King's new clothes, says Sinclair.

"I was very excited when I first read about it, because Acorn said this is the most powerful processor on the block, it's more powerful than anybody else's machine. If that had been true, it would have been very exciting and very impressive – but it happens not to be true at all.

"We had a look at it, and to give you an example, it runs quite a lot of mips, four mips as against two or three on the 80386. The 386 are very powerful instructions, whereas the RISC machine necessarily has simpler instructions."

"When you actually compare them when they're doing an important task, say multiplying two numbers, whereas the 386 does it in two microseconds, the Acorn RISC chip takes about 23 microseconds. So in fact, when it comes to a serious task, it isn't any faster, it is actually a lot slower."

Of course in the real world, there is a huge market for 16-bit micros, Archimedes is the fastest micro most of us have seen, and as for 80mph C5s . . . But it looks like Sir Clive is back with a bang, and may even have got it right again – let's hope so.



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Charting the best of micro chess

Martin Bryant explains how the performance ratings of different computer chess machines and programs are calculated.

Since computer chess programs first became commercially available there has been a constant battle amongst the manufacturers as to whose product was "best". Even if one machine obviously didn't play as well as another, it might have more features available, or be more user friendly with say, automatic detection of piece movements, or better overall value for money etc.

However, when several machines are already closely matched, the manufacturers have to compete with each others' claims as to the playing strength of their machines, and so an inflationary spiral begins – resulting in many ludicrous claims about the machine's ability.

All aspects of a chess machine, apart from its strength, are mainly subjective, so the decision remains with the consumer. Thankfully, nowadays a reliable computer chess machine rating list exists which is regularly updated by impartial enthusiasts. This has been produced for some years now, by the Swedish Computer Chess Association. Many of its members (450 in 1986) like to let their computers play each other. At the moment they play about 200–300 games a month. All these results are then run through a computer and out comes the rating list.

Principles

The rating program, available for the C64, is based on the ELO system, which is also the base for the Swedish and British rating system. Below are some of the principles the Swedes use in making their list.

1. All games are played at tournament level, ie, 40 moves in two hours.

2. They only accept results from their members. This is mostly to get a correct selection of results. They no longer use results published in foreign magazines because they can't tell how they are selected.

3. They do not accept results from members who are commercially involved, because they don't want to have any suspicion of fraud. (In fact 90% of the results come from about 15 well-known members who are trusted, even if the results sometimes look rather odd.)

4. Computers always choose the opening line by themselves. They are strongly opposed to any system that decides which opening line the computers shall play. There is no point in forcing a computer to play a particular opening that it wouldn't play on its own. No-one would suggest that it would be fair if Karpov and Kasparov played for the world championship with predecided openings.

5. They try to play at least 20 games with a certain computer against as many as possible of the other computers. To make this possible, the SCCA owns a couple of computers and also borrows computers from distributors. The computers are then sent to the different testers, who try, as quickly as possible, to play 20 games against their own computer.

6. The members also try to let their computers play in human tournaments. Until now, they've played 238 games against humans, and then they get a special human-rating figure for the computer. They have learned that a rating figure based upon 10–15 games can be very wrong. You have to use the 238 games to decide the absolute level of the list.

The level has been adjusted several times when more games have been played and they now think they're very close to the truth according to the Swedish rating system.

In harmony

It is now strongly believed that the Swedish rating list is a true way of showing the rating difference between computers. The error is, in almost every case, far below the maximal counted with a 95% confidence. The differences are in harmony with personal opinions of people who have experiences of different computers, and can make a fair comparison.

More important, from theory, we know that doubling the computer speed gives about 80 points increase, not 100 as earlier thought by most people.

However, do not believe that the rating figures are exact.

You will always have an error, the bigger the less games played. Computers which are very close can have a different order on the next published list.

Also note that even a result like 20-12 doesn't prove that there is a difference in strength between two computers (or humans) because the error for 32 games can be as high as 100 points with a 95% confidence.

The top twenty machines from the latest list are given below.

Top Twenty

Program	ELO
Mephisto Dallas 68020 14MHz	2081
Mephisto Dallas 68000 12MHz	2061
Mephisto Amsterdam 68000 12MHz	2006
Avant Garde 5MHz	1922
Mephisto Rebel 5MHz	1901
Par Excellence 5MHz	1896
Leonardo Maestro 6MHz	1893
Constellation Forte 5MHz	1881
Conchess Plymate 5.5MHz	1868
Excellence 4MHz	1863
Constellation Expert 4MHz	1849
Conchess Plymate 4MHz	1834
Mephisto MM2 3.7MHz	1834
Mephisto Super Mondial 4MHz	1832
Elegance 3.6MHz – Private Line	1830
Turbostar 432 4MHz	1825
Excellence 3MHz	1825
Super Constellation 4MHz	1782
Conchess Glasgow 4MHz	1772
Mephisto B&P 3.7MHz	1752

If you would like more info on the Swedish rating list or the SCCA and its publications write to: Goran Grottling, Diabsvagen 3, S-437 00 LINDOME, Sweden.

Martin Bryant is the author of Colossus Chess 4.

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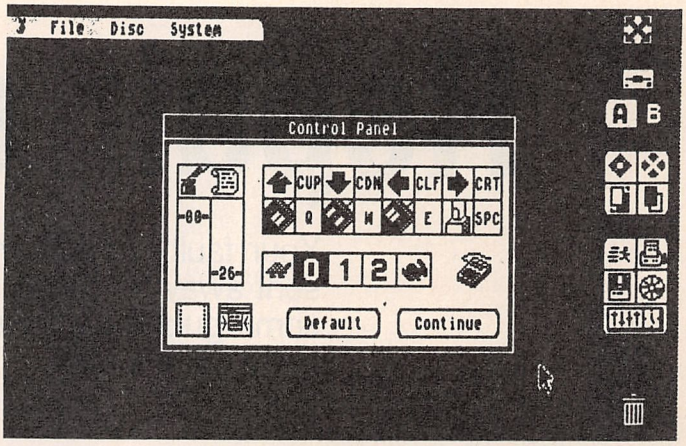
Sampling the menus

Duncan Evans tries out AMS's MAX, an icon driven desktop system for the Amstrad CPCs, designed to give the machine that Macintosh feeling.

Tense, nervous headache? It's probably due to wrestling with your Amstrad's file handling commands. What you really need to relieve the misery is a good Wimp (Window, Icon, Menu, Pointer) system.

Advanced Memory Systems (AMS), producer of the famous AMX mouse and art packages, has turned its attention to producing a desk top environment for all Amstrad disc systems. The good news is that not only is *MAX* compatible with the mouse, you can also use the keyboard or a combination of joystick and keyboard as well.



The control panel allows you to alter parameters such as screen colour, key controls, joystick or mouse, etc

User friendly

The first thing to do to get your user friendly system up and running is to type in the loading command. On first entering the desk top you are presented with a control panel which allows you to change the default colours, pointer speed, keyboard key control and sensitivity. Also displayed are the current controls for Execute, Move and Cancel. If you have an AMX mouse then functions are assigned to the three mouse buttons. The odd things is that if you're using a joystick, the fire button becomes Execute while the others need to be defined on the keyboard. Obviously a clumsy system, one that could have been in some ways helped by only having one key for Execute and Move.

Any changes to the initial set up can be saved on to the *MAX* disc for the next time the software is run.

The display now consists of a column of icons down the right side of the screen and three main pull down menus along the top.

Execution

The first couple of icons represent disc drives A and B. Press Execute while the arrow is resting on them and a window containing a catalogue of that disc's contents, in icon form, appears quite quickly. You can only have one window per drive though, and there's no such thing as folders for storing files. Combine that with a crude resizing and moving windows facility and you have a perfectly adequate system, but it compares (inevitably) rather badly with the desk tops of the ST and Amiga.

After a couple of icons dealing with closing and sorting windows you come to the utilities, the first of which is the run icon. Rather pointlessly, once you have selected a file in a window you have to click on the run icon to load it. No simple point at icon and double click here. One of the flaws in *MAX* tends to surface that this juncture. Namely, you may not be able to load and run the file you want, because *MAX* has eaten up the memory space it would have used. Now, this is unavoidable on a small memory eight bit machine, but it does tend to ruin the idea of a Wimp system.

The other utilities on the desk top include a printer dump, a disc formatter, a standard disc sector editor, the control panel, and a trash can. This latter item is nicely implemented in that once the trash window is opened and a file is dragged into it, it is not actually erased until you empty the trash can at the end of the day. So, if you make a mistake or change your mind over a file you can still reclaim it later.

The first microcomputer to feature drop down menus was the Apple Macintosh, but now this handy facility can be seen on your Amstrad. The big advantage of course of pull down menus is they stay out of sight until you want to use them.

Four such menus are presented here, Mouse, File, Disc and System. The Mouse menu contains options for the control panel, printer, save the control panel, and quit. Nothing that isn't available in icon form in other words.

The File menu provides a useful service in that details on a file can be called up, a file can be locked or unlocked, hidden, erased, renamed, dumped in or rescued from the trash can, and sorted either by icon type or alphabetically. Using *MAX* in this way is only practical if you are dealing with quite a number of files. For just a few it's not worth the effort.

Over in utilities city the Disc menu presides over a disc copier, format and verifier, the sector editor (yes it's the same one as mentioned earlier), the directory editor which allows you to change filenames and locked status directly, and finally an option to speed up disc access, although some drives may become unreliable so its usefulness is debatable.

Useful functions

The final menu merely concerns selecting the current user number which is used for all *MAX* operations. Its preset is zero.

So, that's it. While the system looks pretty and does provide some useful functions, the desk top aspect simply does not work well enough, and on the utilities side, this very magazine has published more powerful listings.

MAX is a reasonable product, but given the inherent problems that a disc-based, as opposed to Rom-based, system has, its potential for constant use is limited.

Product *MAX* **Micro** Amstrad CPC range **Price** £19.99 **Supplier** AMS, 166/170 Wilderspool Causeway, Warrington WA4 6QA.

Repair or bust?

Your faulty Spectrum may not need to be sent away for repair after all. Here, we give some guidelines for simple repairs you can carry out yourself.

Early Spectrums were notorious for developing faults and their lack of durability. If your Spectrum is now past its prime, the chances are that it's no longer in pristine condition, but suffering from loose connections or similar small problems.

However, you may not need to send it away for major surgery. This article aims to describe some of the common problems and how you might be able to solve them yourself.

The basic construction of the Spectrum is made up of the following parts:

	Cost
The central processing unit (Z80A)	£3
Arithmetic and logic unit (ULA)	£10 approx
Rom (operating system)	£5 approx
Ram (memory: 24×2K chips)	£1–£2
Modulator (produces TV pictures)	£3
Keyboard	£3–£5
Power Supply (9V DC at 1.4A)	£7–£10

These parts are linked together by the PCB. However, if something goes wrong all joins, connections and sockets should be checked for breakages and bad connections.

The CPU is the nerve centre of the computer and it controls all the hardware. The Spectrum CPU is a Z80A and runs at a speed of 4mHz. It is located near the user port and has 40 pins. Unfortunately it is very hard to tell if there is a fault in the CPU, as nothing will appear on the screen when the power is plugged in. As the CPU is normally soldered in, special tools are used to replace it, and therefore it is best left to a professional repair company.

The ULA performs many tasks and a faulty ULA, might effect the following: Keyboard decoding; the clock; reading and writing to the tape ports; television picture; reading Ram/Rom.

Any fault in the ULA is best repaired by an expert unless you are good with a soldering iron.

Rom errors are very rare. They can be recognised by the fact that the machine works except for strange errors or characters appearing, or the computer crashes after programming for a while.

Ram errors are more common, and can be recognised by either of the following: the machine crashes when the computer warms up; a pretty (but useless) multi-coloured display on power up.

This can be fixed by changing the Ram chips one by one until the faulty one is discovered. However, first check all the connections to the chips.

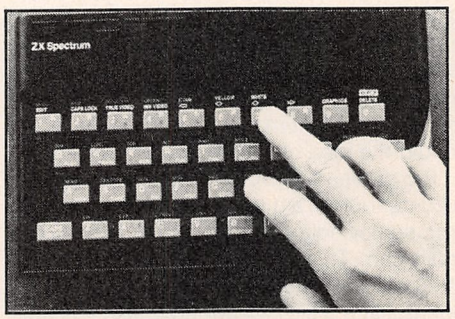
The Ram chips are positioned differently on various issues of the Spectrum, but they should be easy to find as they are all grouped together.

When replacing or removing chips, always have the power supply off and to stop static damaging the chips, a wire can be wrapped arround your wrist and attached to a good earth.

A fault in the Modulator is very rare and in such cases it is best left to the specialist. If the picture is of poor quality, check the leads and the television for the problem which will probably lie there. In issue one and two Spectrums, there is an adjustable capacitor for altering the screen output.

Keyboard faults

Keyboard faults are probably the most common of all. The keyboard is made of a very cheap plastic with metallic strips through it. If one of these strips is broken it is best to buy a new keypad and fit it yourself, which will cost about £3. A temporary fix can be done by using two crocodile clips and a piece of wire, as it is not possible to solder the keypad.



The keyboard probably gives the most trouble

If you suspect the power supply to be faulty, put your ear to the Spectrum and listen for a buzzing sound. Check the power supply with a multimeter and make sure that the voltage is 9V DC at 1.4A. If no reading can be obtained, check the fuse and replace if needed. Very often with the constant wear and tear on the socket a wire will break and this will be the problem, and a new plug should be fitted. If none of the above works a new power supply can be purchased for about £7.

Dismantling the Spectrum is done by removing the four screws from the base (this will invalidate the guarantee if it is still in force). Then turn the board over towards the front, removing the keyboard connections from their sockets, *carefully*. Reconnect the power and television lead, so that you can begin fault finding.

A Rom test can be performed by the following short program. Disconnect all peripherals first.

```
1000 LET T=0 : FOR I= 0 TO 16383: LET T= T + PEEK I :
NEXT I: IF T = 1926175 THEN PRINT "ROM O.K.": STOP
1010 PRINT "ERROR IN ROM"
```

The following program does a Ram test on the top 32K of memory and if there is an error it tells you the Ram chip in which it occurred.

```
2000 CLEAR 32000
2010 FOR I = 32767 TO 65535: POKE I,O : IF PEEK I O
THEN GOTO 2500
2020 POKE I, 255 : IF PEEK I 255 THEN GOTO 2500
2030 NEXT I
2040 PRINT "RAM O.K.":STOP
2500 PRINT "RAM ERROR IN SOCKET";
(INT((I-16385)/2048))
```

If a peripheral is damaged, it should be sent back to its manufacturer for repair or replacement. In some cases the peripheral may cause a fault with the computer, and the most common fault in these cases is the ULA.

Several Spectrums have 'heat' problems; that is, whenever the computer is on for a certain length of time, it crashes. This problem can be solved in many ways, but here are some suggestions:

1 Build a fan into the back of your Spectrum.
2 Replacing the power pack sometimes improves the situation.
3 Make a bigger heatsink.
4 Remove the cover, or drill holes in the casing.

If you cannot repair the Spectrum, it is best to take the following steps when sending it away:

1 Note the serial number.
2 Always get a quotation on the maximum cost for the repair.
3 State the fault in detail.
4 When the computer is returned, examine it carefully and check the serial number.

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I remember the day my wife phoned me, crying, because the landlord had shown up at the house, demanding his rent – and we didn't have the money to pay it.

Now we own five homes. Two are on the oceanfront in California (I use one as my office). One is a lakefront "cabin" in Washington (that's where we spend the whole summer – loafing, fishing, swimming, and sailing). One is a condominium on a sunny beach in Mexico. And one is snuggled right on the best beach of the best island in Hawaii – Maui.

Right now I could sell all this property, pay off the mortgages – and – without touching any of my other investments – walk away with over $750,000 in cash. But I don't want to sell, because I don't think of my homes as "investments." I've got other real estate – and stocks, bonds, and cash in the bank – for that.

I remember when I lost my job. Because I was head over heels in debt, my lawyer told me the only thing I could do was declare bankruptcy. He was wrong. I paid off every dime.

Now, I have a million dollar line of credit; but I still don't have a job. Instead, I get up every weekday morning and decide whether I want to go to work or not. Sometimes I do – for 5 or 6 hours. But about half the time, I decide to read, go for a walk, sail my boat, swim, or ride my bike.

I know what it's like to be broke. And I know what it's like to have everything you want. And I know that you – like me – can *decide* which one it's going to be. It's really as easy as that. That's why I call it "The Lazy Man's Way to Riches."

So I'm going to ask you to send me something I don't need: money. £10 to be exact. Why? Because I want you to pay attention. And I figure that if you've got £10 invested, you'll look over what I send you and decide whether to send it back... or keep it. And I don't *want* you to keep it unless you agree that it's worth at least a hundred times what you invested.

Is the material "worth" £10? No – if you think of it as paper and ink. But that's not what I'm selling. What I am selling is information. *More* information than I give when I'm paid $1000 as a guest speaker. *More* information than I give in a one-hour consultation for $300.

But you're really not risking *anything*. Because I won't cash your cheque or money order for 31 days *after* I've sent you my material. That's the deal. Return it in 31 days – and I'll send back your cheque or postal order – uncashed.

How do you know I'll do it? Well, if you really want to be on the safe side, postdate your cheque for a month from today – *plus 2 additional weeks*. That'll give you plenty of time to receive it, look it over, try it out.

I know what your thinking: "He got rich telling people how to get rich." The truth is – and this is very important – the year before I shared "The Lazy Man's Way to Riches," my income was $216,646. And what I'll send you tells just how I made that kind of money... working a few hours a day... about 8 months out of the year.

It doesn't require "education." I'm a high school graduate.

It doesn't require "capital." Remember I was up to my neck in debt when I started.

It doesn't require "luck." I've had more than my share. But I'm not promising you that you'll make as much money as I have. And you may do better. I personally know one man who used these principles, worked hard, and made 11 million dollars in 8 years. But money isn't everything.

It doesn't require "talent." Just enough brains to know what to look for. And I'll tell you that.

It doesn't require "youth." One woman I worked with is over 70. She's travelled the world over, making all the money she needs, doing only what I taught her.

It doesn't require "experience." A widow in Chicago has been averaging $25,000 a year for the past 5 years, using my methods.

What does it require? Belief. Enough to take a chance. Enough to absorb what I'll send you. Enough to put the principles into *action*. If you do just that – nothing more, nothing less – the results will be hard to believe. Remember – I guarantee it.

You don't have to give up your job. But you may soon be making so much money that you'll be able to. Once again – I guarantee it.

I know you're sceptical. Well, here are some comments from other people. (Initials have been used to protect the writer's privacy. The originals are in my files.) I'm sure that, like you, these people didn't believe me either when they clipped the coupon. Guess they figured that, since I wasn't going to deposit their cheques for at least 31 days, they had nothing to lose.

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And here's what they gained:

'Thanks to your method I'm a half millionaire'

"Thanks to your method I grossed about $500,000. Would you believe last year at this time I was a slave working for peanuts?"

G.C., Toronto, Canada.

'$24,000 in 45 days'

"...received $24,000.00 in the mail the last 45 days.

"Thanks again."

Mr. E.G.N., Matewan, W.VA

'Made enough to retire at 41'

"If it hadn't happened to me, I wouldn't have believed it... A few years ago, I had nothing to lose. I was unemployed and broke."

"Now, thanks to you and the 'Lazy Man's' program, I have made enough money (at age 41) to retire in style.

R.A., Huntingdon Beach, Calif.

'There's no stopping me'

"Since I've got your (Lazy Man's Way to Riches) in July, I've started 4 companies... there's no stopping me and I'm so high I need chains to keep me on the ground."

M.T., Portland, OR

'Wow, it does work!'

"Oddly enough, I purchased Lazy Man's Way to Riches some six months ago, or so, read it... and really did nothing about it. Then, about three weeks ago, when I was really getting desperate about my financial situation, I remembered it, re-read it, studied it, and this time, put it to work and WOW, it does work! Doesn't take much time, either... I guess some of us just have to be at a severe point of desperation before we overcome the ultimate laziness, procrastination."

Mr. J.K., Anaheim, CA

'Made $70,000'

"A $70,000 thanks to you for writing The Lazy Man's Way to Riches. That's how much I've made...

"I use this extra income for all of the good things in life, exotic vacations, classic automobiles, etc. Soon I hope to make enough to quit my regular job and devote full time to making money the easy way..."

Mr. D.R., Newport Beach, CA

'$260,000 in eleven months'

"Two years ago, I mailed you ten dollars in sheer desperation for a better life... One year ago, just out of the blue sky, a man called and offered me a partnership... I grossed over $260,000 cash business in eleven months. You are a God sent miracle to me."

B.F., Pascagoula, Miss.

'Steadily upward ever since'

"I ordered Lazy Man's Way to Riches in June... by September, my career was launched and has gone steadily upward ever since."

Mrs. B.A., Walnut Creek, CA

'$7,000 in five days'

"Last Monday I used what I learned on page 83 to make $7,000. It took me all week to do it, but that's not bad for five day's work."

M.D., Topeka, Kansas

What I'm saying is probably contrary to what you've heard from your friends, your family, your teachers, and maybe everyone else you know.

I can only ask you one question. How many of them are millionaires?

So it's up to you.

A month from today, you can be nothing more than 30 days older – or you can be on your way to getting rich. You decide.

The wisest man I ever knew told me something I never forgot: "Most people are too busy earning a living to make any money."

Don't take as long as I did to find out he was right.

I'll prove it to you, if you'll send in the coupon to my publisher now. I'm not asking you to "believe" me. Just try it. If I'm wrong, all you've lost is a couple of minutes and a postage stamp. But what if I'm right?

Some have called it a Miracle. Some have called it Magic. You'll call it "The Secret of the Ages."

As for me, I thank God that before he died Millionaire Joe Karbo left, for all to share, the secret of "The Lazy Man's Way to Riches." The above story, which is in his own words, is his gift to you.

Sworn Statement:

"On the basis of my professional relationship as his accountant. I certify that Mr. Karbo's net worth is more than one million dollars."

Stuart A. Cogan

PROOF!

Don't take my word for it. These are excerpts from articles in newspapers and magazines:

Time:

He only works half the year in his stunning office on California's Sunset Beach, and even when he's there he puts in short hours... In other words, Joe Karbo, 48, is the prototype for... "The Lazy Man's Way to Riches.'

Boston Herald-American:

The book has drawn hundreds of letters from persons who have profited by it...

Los Angeles Herald-Examiner:

An unpretentious millionaire, Joe Karbo of Huntingdon Harbor is a vibrant, living testimonial to his intellectual, pragmatic conviction.

Money Making Opportunities:

Maybe Joe Karbo has the secret. Don't you think you owe it to yourself to find out what it is all about?... I just finished it – and I'm off on a vacation myself. Get the idea?

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You may be full of beans, but what have I got to lose? Send me the Lazy Man's Way to Riches. *But don't deposit my cheque or postal order for at least 31 days after it's in the mail.* If I return your material – for any reason – within that time, return my uncashed cheque or postal order to me.

☐ On that basis, here's my £10
☐ Please charge my credit card.

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Musical codes

In the second part of his feature on programming sound chips, Kenn Garroch explains what kind of software you need and how to go about writing it.

Last week I discussed the various sound generation techniques, from piezo-electric sounders to Digital to Analogue Converters (DACs). I also ran through the various elements that make up a sound, including envelopes. This week I'll look at various methods of programming sound chips to create sound effects and play music.

One of the big problems with home computers is their incompatibility. They may all use Basic but they begin to differ wildly when it comes to accessing peripherals such as sound chips. For this reason, I'll have to be fairly general about the methods actually used to access the chips and their facilities. What is more important are the ideas and methods used to perform the various effects.

Probably the most common use for a sound chip is to produce effects for a game. To create a sound effect, the first thing to do is to get a good idea of the capabilities of the chip your machine supports. This can be done with the help of a monitor program that allows full access to all of the chip's facilities and provides some kind of editor so you can change and set the sounds.

There are many of these programs around in books and magazines and as I said above, computers are so diverse in their facilities and capabilities, it is difficult to be specific.

However, to write a program like this in Basic, all you need to know is how to access the sound chip directly from Basic, usually using the Peek and Poke commands. Then read all of the chip's registers and place them on to the screen with their names and any other notation you think necessary. All of the information for this is usually available in a good user guide.

The contents of the registers should be displayed in binary as this is the commonest method of using them, ie, a mixer register uses various bits to turn channels on and off so they will certainly need to be displayed in binary to see what is happening.

The next step is to provide some kind of screen editor, usually by means of the text cursor, that allows the individual registers to be edited, bit by bit if possible. Once changes have been made to the screen, they can be written back to the chip either with an execute command to do them all at once or in real time as they are edited.

Once you have a monitor program of this kind, experimenting with the sound chip is made a great deal easier, and if you decide on a particular sound or sequence of sounds all you need to do is write the various register values down and they can be used later to produce the particular effect in a program. This is probably the best method of creating sound effects since you can actually hear what you're getting.

Of course, there are commercial programs available to perform the functions I have described above. If you feel like shelling out the brass then obtain one of these, as it will save you time and effort.

The disadvantage is that you don't gain any experience in the problem encountered whilst writing a program to set up the sounds, which comes in handy when actually implementing them in a program.

The other main use of sound chips is to play music and, although a few machines do provide facilities in Basic to do this easily, most do not. Again, there are commercial products that will take all of the hard work out of the composing and playing process but the same arguments as before apply, and you don't get such a flexible system as you would if you write your own.

The main component of a music system is something to keep regular time so that the music plays at its correct speed, and nothing interferes with it. Depending on the computer, there are a number of ways of doing this, the best being via the use of interrupts. Fortunately, most modern Basics provide an ON TIMER command or something similar so the programming is made easy. However, some don't and you will have to program around it.

In machine code, it isn't usually a problem since the microprocessor's interrupts are available for use. In Basic, the fact that programs usually run at a constant speed can be utilised. Simply have a routine that counts down until the next note or change to the sound chip is needed, then jump to a subroutine that makes the change.

The other main part of a music program is that which loads the chip with the correct values, or sets up the correct Basic statements to produce the note and/or sound. Probably the best method is to use data statements to hold the note values, transfer them to an array before the tune is started, and then use the array as the source of information for the chip or sound commands. A pointer to the current information is maintained throughout the tune so that the whole thing knows where it is.

For example, the tune may consist of frequency numbers that are loaded into the sound chip, or fed into a sound command. If there are three voices, three values will need to be moved every time an interrupt or time out occurs. At the beginning, the pointer points to the first location in the array.

At the first interrupt, the music subroutine picks up three note values, and moves them to the chip. The pointer then has three added to it, and the routine ends.

When it is called again, it performs exactly the same sequence of instructions and so on. In this way, the whole tune can be played. The important point is that the same instructions should be used over and over, and the routine should always take the same amount of time to execute. If it doesn't then the tempo of the tune may suffer.

This is certainly the case when using time outs but it may not be too noticeable when using interrupts.

Converting tunes into numbers is something else that can easily be mechanised and as with most other programming ideas, this is available commercially. If you want to go to the DIY method, one way is to put the notes in data statements as their letter names using + and – to denote going up or down an octave.

The sequence CDEFedc would tell the program to play from C to F upward, and then back down to c via e and d. CC+ would mean play the current C and then one an octave above. *Tn* can be used to set the tempo to the value *n,* etc.

All you need to do is develop a selection of commands that will perform all the functions needed. A program can then be used to code these into a form that the music playing program can interpret quickly and easily.

How you go about using your sound facilities depends on what you want them for. If you simply want to play tunes then a commercial package is probably the best bet.

If you want to use them in programs, and use sound effects as well then writing some of the programs described above is probably the way to go.

Catacombs

P Fox

Part two of our *Gauntlet* variant, with its own maze designer, is presented this week. Type in the game listing and save it on a separate cassette. Then type in the four data listings and save each as SAVE "name" LINE 10. Now, reload the first data listing, remembering to pause your cassette deck while the data is being poked in, and the other three listings will be automatically loaded. Finally, the code is now saved in two parts, and should be placed after the main game listing.

```
  1 REM section 2
  10 REM room data 2
  20 RESTORE 1000: FOR c=46656 TO 47103:
READ a: POKE c,a: NEXT c
  30 REM character set + program
  40 RESTORE 1056: FOR c=59392 TO 60543:
READ a: POKE c,a: NEXT c
  50 LOAD ""
1000 DATA 002,074,075,005,000,000,000,000
1001 DATA 000,000,000,002,000,000,000,000
1002 DATA 000,000,000,000,000,000,000,000
1003 DATA 018,000,000,000,000,079,080,002
1004 DATA 002,000,000,018,000,000,000,000
1005 DATA 000,000,000,002,000,000,000,000
1006 DATA 000,000,000,000,000,000,000,000
1007 DATA 019,000,000,000,000,000,000,002
1008 DATA 002,000,000,019,000,000,000,000
1009 DATA 000,000,000,002,000,000,000,000
1010 DATA 000,072,073,000,000,000,000,000
1011 DATA 006,000,000,000,000,000,000,002
1012 DATA 002,000,000,006,022,000,000,000
1013 DATA 000,020,020,002,000,000,000,000
1014 DATA 000,074,075,000,000,000,000,000
1015 DATA 002,020,020,020,000,000,000,002
1016 DATA 002,000,000,012,001,001,001,001
1017 DATA 001,001,001,011,016,017,009,001
1018 DATA 001,001,001,001,001,001,001,001
1019 DATA 015,001,001,001,001,001,001,011
1020 DATA 002,000,000,005,020,000,000,000
1021 DATA 000,000,020,005,000,000,002,021
1022 DATA 000,000,000,000,000,000,000,000
1023 DATA 005,000,000,000,000,000,000,002
1024 DATA 002,000,000,018,000,000,000,000
1025 DATA 000,000,000,018,000,000,002,000
1026 DATA 000,000,000,000,000,000,000,000
1027 DATA 018,000,000,000,000,000,000,002
1028 DATA 002,000,000,019,000,000,000,000
1029 DATA 000,000,000,019,000,000,002,000
1030 DATA 000,000,000,000,000,000,000,000
1031 DATA 019,000,000,000,000,000,000,002
1032 DATA 002,000,000,006,000,000,000,000
1033 DATA 000,072,073,006,000,000,002,000
1034 DATA 000,000,000,000,000,000,000,000
1035 DATA 006,000,000,000,000,000,000,002
1036 DATA 002,000,000,002,023,000,000,000
1037 DATA 000,074,075,002,000,000,002,020
1038 DATA 000,000,000,000,000,000,000,000
1039 DATA 002,000,000,000,000,000,000,002
1040 DATA 002,000,000,007,001,001,001,001
1041 DATA 001,001,001,008,000,000,007,001
1042 DATA 001,001,001,001,001,001,016,017
1043 DATA 002,000,000,000,000,000,000,002
1044 DATA 002,000,000,000,000,000,000,000
1045 DATA 000,000,000,018,000,000,000,000
1046 DATA 000,000,000,000,000,000,000,000
1047 DATA 002,000,000,000,000,000,000,002
1048 DATA 002,000,000,000,000,000,000,000
1049 DATA 000,000,000,019,000,000,000,000
1050 DATA 000,000,000,000,000,000,000,000
1051 DATA 002,023,000,000,000,000,022,002
1052 DATA 007,001,001,001,001,001,001,001
1053 DATA 001,001,001,001,001,001,001,001
1054 DATA 001,001,001,001,001,001,001,001
1055 DATA 014,001,090,091,092,093,094,095
1056 DATA 000,000,000,000,000,000,000,000
1057 DATA 000,016,016,016,016,000,016,000
1058 DATA 000,036,036,000,000,000,000,000
1059 DATA 000,036,126,036,036,126,036,000
1060 DATA 000,008,062,040,062,010,062,008
1061 DATA 000,098,100,008,016,038,070,000
1062 DATA 000,016,040,016,042,068,058,000
1063 DATA 000,008,016,000,000,000,000,000
1064 DATA 000,004,008,008,008,008,004,000
1065 DATA 000,032,016,016,016,016,032,000
1066 DATA 000,000,020,008,062,008,020,000
1067 DATA 000,000,008,008,062,008,008,000
1068 DATA 000,000,000,000,000,008,008,016
1069 DATA 000,000,000,000,062,000,000,000
1070 DATA 000,000,000,000,000,024,024,000
1071 DATA 000,000,002,004,008,016,032,000
1072 DATA 000,060,102,110,126,118,060,000
1073 DATA 000,028,060,012,012,012,062,000
1074 DATA 000,060,102,006,060,096,126,000
1075 DATA 000,060,102,012,006,102,060,000
1076 DATA 000,024,056,040,104,126,024,000
1077 DATA 000,126,096,124,006,102,060,000
1078 DATA 000,060,096,124,102,102,060,000
1079 DATA 000,126,006,012,024,048,048,000
1080 DATA 000,060,102,060,102,102,060,000
1081 DATA 000,060,102,102,062,006,060,000
1082 DATA 000,000,000,016,000,000,016,000
1083 DATA 000,000,016,000,000,016,016,032
1084 DATA 000,000,004,008,016,008,004,000
1085 DATA 000,000,000,062,000,062,000,000
1086 DATA 000,000,016,008,004,008,016,000
1087 DATA 000,060,066,004,008,000,008,000
1088 DATA 000,060,074,086,094,064,060,000
1089 DATA 000,060,102,102,126,102,102,000
1090 DATA 000,124,102,124,102,102,124,000
1091 DATA 000,060,102,096,096,102,060,000
1092 DATA 000,120,108,102,102,108,120,000
1093 DATA 000,126,096,124,096,096,126,000
1094 DATA 000,126,096,124,096,096,096,000
1095 DATA 000,060,102,096,110,102,060,000
1096 DATA 000,102,102,126,102,102,102,000
1097 DATA 000,062,024,024,024,024,062,000
1098 DATA 000,006,006,006,102,102,060,000
1099 DATA 000,108,120,112,120,108,102,000
1100 DATA 000,096,096,096,096,096,126,000
1101 DATA 000,066,102,126,102,102,102,000
1102 DATA 000,102,118,126,110,102,102,000
1103 DATA 000,060,102,102,102,102,060,000
1104 DATA 000,124,102,102,124,096,096,000
1105 DATA 000,060,102,102,118,110,060,000
1106 DATA 000,124,102,102,124,108,102,000
1107 DATA 000,060,096,060,006,102,060,000
1108 DATA 000,254,048,048,048,048,048,000
1109 DATA 000,102,102,102,102,102,060,000
1110 DATA 000,102,102,102,102,060,024,000
1111 DATA 000,102,102,102,102,126,036,000
1112 DATA 000,102,060,060,060,060,102,000
1113 DATA 000,198,108,056,024,024,024,000
1114 DATA 000,126,006,012,024,048,126,000
1115 DATA 000,014,008,008,008,008,014,000
1116 DATA 000,000,064,032,016,008,004,000
1117 DATA 000,112,016,016,016,016,112,000
1118 DATA 000,016,056,084,016,016,016,000
1119 DATA 000,000,000,000,000,000,000,255
1120 DATA 000,028,034,120,032,032,126,000
1121 DATA 000,000,056,004,060,068,060,000
1122 DATA 000,032,032,060,034,034,060,000
1123 DATA 000,000,028,032,032,032,028,000
1124 DATA 000,004,004,060,068,068,060,000
1125 DATA 000,000,056,068,120,064,060,000
1126 DATA 000,012,016,024,016,016,016,000
1127 DATA 000,000,060,068,068,060,004,056
1128 DATA 000,064,064,120,068,068,068,000
1129 DATA 000,016,000,048,016,016,056,000
1130 DATA 000,004,000,004,004,004,036,024
1131 DATA 000,032,040,048,048,040,036,000
1132 DATA 243,205,105,234,205,049,239,251
1133 DATA 201,033,000,064,017,001,064,001
1134 DATA 255,015,054,000,237,176,033,000
1135 DATA 088,017,001,088,001,255,001,054
1136 DATA 000,237,176,175,050,238,253,050
1137 DATA 242,253,033,087,080,205,007,243
1138 DATA 033,215,080,175,205,007,243,062
1139 DATA 099,050,237,253,033,194,080,205
1140 DATA 007,243,062,099,050,239,253,033
1141 DATA 201,080,205,007,243,001,000,000
1142 DATA 237,067,240,253,033,208,080,205
1143 DATA 247,242,058,242,253,135,198,176
1144 DATA 103,046,000,017,000,227,001,000
1145 DATA 002,237,176,033,000,229,017,001
1146 DATA 229,001,255,002,054,254,237,176
1147 DATA 062,255,050,252,229,050,252,230
1148 DATA 017,000,227,033,000,231,026,254
1149 DATA 072,040,008,019,122,254,229,040
1150 DATA 039,024,243,123,230,031,119,035
1151 DATA 213,235,001,000,227,167,237,066
1152 DATA 041,041,041,124,235,209,119,035
1153 DATA 054,015,035,124,254,231,032,008
1154 DATA 019,122,254,229,040,002,024,206
1155 DATA 062,255,050,255,231,205,155,236
1156 DATA 205,065,235,205,185,237,205,065
1157 DATA 237,205,048,242,001,254,127,237
1158 DATA 120,230,001,254,001,192,237,075
1159 DATA 243,253,011,121,176,032,251,024
```

continued on page 21 ▶

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```
1160 DATA 220,237,075,232,253,237,067,234
1161 DATA 253,205,129,242,054,000,044,054
1162 DATA 000,017,031,000,025,054,000,044
1163 DATA 054,000,001,254,254,237,120,230
1164 DATA 004,254,004,040,017,058,232,253
1165 DATA 060,254,031,048,009,050,234,253
1166 DATA 175,050,236,253,024,083,001,254
1167 DATA 254,237,120,230,002,254,002,040
1168 DATA 017,058,232,253,167,040,011,061
1169 DATA 050,234,253,062,002,050,236,253
1170 DATA 024,055,001,254,191,237,120,230
1171 DATA 004,254,004,040,018,058,233,253
1172 DATA 254,014,048,011,060,050,235,253
1173 DATA 062,001,050,236,253,024,026,001
1174 DATA 254,223,237,120,230,002,254,002
1175 DATA 040,015,058,233,253,167,040,009
1176 DATA 061,050,235,253,062,003,050,236
1177 DATA 253,237,075,234,253,205,129,242
1178 DATA 205,164,242,167,040,043,254,016
1179 DATA 056,047,254,020,218,242,238,202
1180 DATA 171,238,254,021,202,147,238,254
1181 DATA 022,202,195,238,254,023,202,219
1182 DATA 238,254,085,048,020,254,081,210
1183 DATA 117,239,254,077,210,139,239,024
1184 DATA 008,237,075,234,253,237,067,232
1185 DATA 253,237,075,232,253,205,129,242
1186 DATA 058,232,253,230,001,071,058,233
1187 DATA 253,230,001,168,071,058,236,253
1188 DATA 230,003,135,128,135,135,198,024
1189 DATA 119,060,044,119,001,031,000,009
1190 DATA 060,119,044,060,119,001,254,223
1191 DATA 237,120,230,001,254,001,200,058
1192 DATA 239,253,167,200,017,000,230,026
1193 DATA 254,254,040,012,254,255,200,028
1194 DATA 028,028,028,123,167,200,024,239
1195 DATA 237,075,232,253,058,236,253,167
1196 DATA 040,011,254,001,040,011,254,002
1197 DATA 040,012,005,024,011,012,012,024
1198 DATA 007,012,004,004,024,002,004,013
1199 DATA 205,129,242,126,167,192,062,076
```


ADS

Adam Newby

This week features the concluding section of the assembler/disassembler system for the 8-bit Atari machines.

Note that, after loading, if your program does an RTS, Basic will be initialised, and a hard reset will occur. This does not wipe out page six.

If you need to break out of the program to test something or to, do a calculation, typing GOTO followed by MAINMENU, ASSMENU or DISMENU will take you to the main, assembler and disassembler menus.

Various errors may occur while using the assembler, as follows:

No more room for program. This error will occur while entering a program or listing one from the disassembler if you have not reserved enough space for it at the start.

Unknown command. You have mistyped a command, and the assembler does not recognise it.

Jump to non-existent line. The line specified in a jump or branch does not exist. (Should it have been a JMPOUT or a JSROUT?)

Program not yet assembled. You tried to save or run your program without having first assembled it.

No room for line. You tried to insert a line when you had not reserved enough space for it at the start.

Line does not exist. You specified a non-existent line in one of the editing functions.

No more room for labels. You tried to define a label when you had not reserved enough space for it at the start.

Undefined label. The assembler came across a label and did not recognise it. (Did you mistype it?)

Label referred to non-existent line. An address label refers to an unwritten line.

Program is too big. A source file you attempted to load will not fit into the reserved space.

Too many labels. A source file you attempted to load had more labels than you had reserved space for.

Program is too low down in memory. There is not enough space before your program for the boot loader data.

Pressing 2 when the main menu is displayed will display the disassembler menu, which gives the following functions.

1 – List to screen. This will list in assembly language the contents of a specified area of memory.

2 – List to assembler. This will turn the contents of a specified area of memory into an assembler source listing. The line numbers are the addresses of each instruction. Note that all JMPS and JSRS are assumed to be within the program, so you may need to change them to JMPOUTS or JSROUTS.

3 – Return to main menu. This will display the assembler/disassembler selection page.

In both the assembler and the disassembler, all numbers can be specified in decimal or hexadecimal. If you use hexadecimal, put a "$" before the number.

Note that if, while listing to assembler, or listing to screen using the disassembler, you enter the address of a block of memory in hexadecimal, all numbers will be converted to hexadecimal. If not, decimal will be used.

So now you know how to use ADS. Some of the routines in it may be useful to you – 7000 onwards is the hexadecimal to decimal converter, and 8000 onwards is the decimal to hexadecimal converter. 5000 onwards are the save/load code routines.

If you can't be bothered to type in the program, it is available on cassette for £3.00 from 41 Forest Grove, Harrogate, North Yorkshire HG2 7JU.

```
4320 GET #1,DP:GET #1,NAO
4325 IF DP>MNLI THEN CLOSE #1:? "Program is too big.":GOTO 515
4327 IF NAO>MNLB THEN CLOSE #1:? "Too many labels.":GOTO 515
4330 FOR N=6 TO DP*6+5
4340 GET #1,A:APLN$(N,N)=CHR$(A)
4350 NEXT N
4360 FOR N=6 TO DP*6+5
4370 GET #1,A:APR$(N,N)=CHR$(A)
4380 NEXT N
4390 FOR N=6 TO DP*6+5
4400 GET #1,A:AO$(N,N)=CHR$(A)
4410 NEXT N
4415 IF NAO=0 THEN CLOSE #1:? "Load completed.":GOTO 515
```

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```
4420 FOR N=6 TO NAO*6+5
4430 GET #1,A:AOD$(N,N)=CHR$(A)
4440 NEXT N
4450 FOR N=6 TO NAO*6+5
4460 GET #1,A:AODV$(N,N)=CHR$(A)
4470 NEXT N
4480 FOR N=1 TO NAO
4490 GET #1,L:LT(N)=L
4500 NEXT N
4510 CLOSE #1:? "Load completed.":AFLG=0:GOTO 515
5000 ? "}Press:":? :? " 1 to save current Program,":? " 2 to save other Program.
"
5010 GET #1,C:INKEY$=CHR$(C)
5020 IF INKEY$="1" THEN GOTO 5130
5030 IF INKEY$="2" THEN ? :? "Start address";:INPUT A$:? :? "End address";:INPUT
 B$:GOTO 5150
5040 GOTO 5010
5050 ? "}Press Play & record on tape recorder, wait for the beep,then Press retu
rn."
5060 CLOSE #1:OPEN #1,8,0,"C:"
5070 PUT #1,ST-256*INT(ST/256):PUT #1,INT(ST/256)
5080 PUT #1,EN-256*INT(EN/256):PUT #1,INT(EN/256)
5090 FOR A=ST TO EN
5100 PUT #1,PEEK(A)
5110 NEXT A
5120 CLOSE #1:? "Save completed.":SOUND 0,0,0,0:GOTO 515
5130 IF AFLG=0 THEN ? "Program not yet assembled.":GOTO 515
5140 ST=STADDR:EN=ADDR:GOTO 5050
5150 C$=A$(1,1):IF C$="$" THEN HEX$=A$:GOSUB 7000:ST=V:GOTO 5160
5155 ST=VAL(A$)
5160 C$=B$(1,1):IF C$="$" THEN HEX$=B$:GOSUB 7000:EN=V:GOTO 5050
5165 EN=VAL(B$)
5170 GOTO 5050
5200 ? "}Press Play on tape recorder,wait for  the beep,then Press return."
5210 CLOSE #1:OPEN #1,4,0,"C:"
5220 GET #1,A:GET #1,B:ST=A+B*256:? :? " Start address = ";ST;"(";:DEC=ST:GOSUB
8000:? HEX$;")"
5230 GET #1,A:GET #1,B:EN=A+B*256:? :? " End address = ";EN;"(";:DEC=EN:GOSUB 80
00:? HEX$;")":?
5240 FOR A=ST TO EN
5250 GET #1,X:POKE A,X
5260 NEXT A
5270 CLOSE #1:? "Load completed.":GOTO 515
6000 ? "}Press:":? :? " 1 to use current Program,":? " 2 to use other Program."
6010 GET #1,C:INKEY$=CHR$(C)
6020 IF INKEY$="1" THEN GOTO 6160
6030 IF INKEY$="2" THEN ? :? "Start address";:INPUT A$:? :? "End address";:INPUT
 B$:GOTO 6180
6040 GOTO 5010
6050 IF ST<1549 THEN ? "Program is too low down in memory.":GOTO 515
6060 ? "}Press Play & record on tape recorder, wait for the beep,then Press retu
rn."
6070 CLOSE #1:OPEN #1,8,128,"C:"
6080 PUT #1,0:PUT #1,INT((EN-ST)/128+0.9921875)
6090 PUT #1,ST-13-256*INT((ST-6)/256):PUT #1,INT((ST-13)/256)
6100 PUT #1,ST-256*INT(ST/256):PUT #1,INT(ST/256)
6110 PUT #1,24:PUT #1,169:PUT #1,60:PUT #1,141:PUT #1,2:PUT #1,211:PUT #1,96
6120 FOR A=ST TO EN
6130 PUT #1,PEEK(A)
6140 NEXT A
6150 CLOSE #1:? "Boot loader created.":SOUND 0,0,0,0:GOTO 515
6160 IF AFLG=0 THEN ? "Program not yet assembled.":GOTO 515
6170 ST=STADDR:EN=ADDR:GOTO 6050
6180 C$=A$(1,1):IF C$="$" THEN HEX$=A$:GOSUB 7000:ST=V:GOTO 6190
6185 ST=VAL(A$)
6190 C$=B$(1,1):IF C$="$" THEN HEX$=B$:GOSUB 7000:EN=V:GOTO 6050
6195 ST=VAL(A$)
```

```
6200 GOTO 6050
7000 IF HEX$(4,4)=" " THEN K=16:GOTO 7015
7010 K=4096
7015 V=0
7020 FOR N=2 TO 5
7025 IF HEX$(N,N)=" " THEN RETURN
7030 H$=HEX$(N,N)
7040 IF H$>="A" AND H$<="F" THEN V=V+(K*(ASC(H$)-55)):GOTO 7060
7050 V=V+(K*(ASC(H$)-48))
7060 K=K/16:IF K<1 THEN RETURN
7070 NEXT N
8000 HEX$(1,1)="$"
8005 SF=0
8010 K=4096:IF DEC<256 THEN K=16:SF=1
8020 FOR N=2 TO 6
8030 IF DEC/K>=1 THEN GOTO 8080
8040 HEX$(N,N)="0"
8050 K=K/16:IF K<1 THEN GOTO 8065
8060 NEXT N
8065 IF SF=1 THEN HEX$(4,6)="  "
8066 IF SF=0 THEN HEX$(6,6)=" "
8070 RETURN
8080 PH=INT(DEC/K)
8090 IF PH>9 THEN HEX$(N,N)=CHR$(PH+55):GOTO 8110
8100 HEX$(N,N)=CHR$(PH+48)
8110 DEC=DEC-PH*K:GOTO 8050
10000 DATA BRK,0,ORAI.X,2,ERR,0,ERR,0,ERR,0,ORAZ,1,ASLZ,1,ERR,0,PHP,0,ORA#,1,ASL
A,0,ERR,0,ERR,0,ORA,2
10010 DATA ASL,2,ERR,0,BPL,3,ORAI.Y,2,ERR,0,ERR,0,ERR,0,ORAZ.X,1,ASLZ.X,1,ERR,0,
CLC,0,ORA.Y,2,ERR,0,ERR,0,ERR,0
10020 DATA ORA.X,2,ASL.X,2,ERR,0,JSR,2,ANDI.X,2,ERR,0,ERR,0,BITZ,1,ANDZ,1,ROLZ,1
,ERR,0,PLP,0,AND#,1,ROLA,0,ERR,0
10030 DATA BIT,2,AND,2,ROL,2,ERR,0,BMI,3,ANDI.Y,2,ERR,0,ERR,0,ERR,0,ANDZ.X,1,ROL
Z.X,1,ERR,0,SEC,0,AND.Y,2
10040 DATA ERR,0,ERR,0,ERR,0,AND.X,2,ROL.X,2,NOP,0,RTI,0,EORI.X,2,ERR,0,ERR,0,ER
R,0,EORZ,1,LSRZ,1,ERR,0
10050 DATA PHA,0,EOR#,1,LSRA,0,ERR,0,JMP,2,EOR,2,LSR,2,ERR,0,BVC,3,EORI.Y,2,ERR,
0,ERR,0,ERR,0
10060 DATA EORZ.X,1,LSRZ.X,1,ERR,0,CLI,0,EOR.Y,2,ERR,0,ERR,0,ERR,0,EOR.X,2,LSR.X
,2,ERR,0
10070 DATA RTS,0,ADCI.X,2,ERR,0,ERR,0,ERR,0,ADCZ,1,RORZ,1,ERR,0,PLA,0,ADC#,1,ROR
A,0,ERR,0,JMPI,2,ADC,2,ROR,2
10080 DATA ERR,0,BVS,3,ADCI.Y,2,ERR,0,ERR,0,ERR,0,ADCZ.X,1,RORZ.X,1,ERR,0,SEI,0,
ADC.Y,2,ERR,0,ERR,0,ERR,0,ADC.X,2
10090 DATA ROR.X,2,ERR,0,ERR,0,STAI.X,2,ERR,0,ERR,0,STYZ,1,STAZ,1,STXZ,1,ERR,0,D
EY,0,ERR,0,TXA,0,ERR,0
10100 DATA STY,2,STA,2,STX,2,ERR,0,BCC,3,STAI.Y,2,ERR,0,ERR,0,STYZ.X,1,STAZ.X,1,
STXZ.Y,1,ERR,0
10110 DATA TYA,0,STA.Y,2,TXS,0,ERR,0,ERR,0,STA.X,2,ERR,0,ERR,0,LDY#,1,LDAI.X,2,L
DX#,1,ERR,0,LDYZ,1,LDAZ,1,LDXZ,1
10120 DATA ERR,0,TAY,0,LDA#,1,TAX,0,ERR,0,LDY,2,LDA,2,LDX,2,ERR,0,BCS,3,LDAI.Y,2
,ERR,0,ERR,0,LDYZ.X,1
10130 DATA LDAZ.X,1,LDXZ.Y,1,ERR,0,CLV,0,LDA.Y,2,TSX,0,ERR,0,LDY.X,2,LDA.X,2,LDX
.Y,2,ERR,0,CPY#,1,CMPI.X,2,ERR,0
10140 DATA ERR,0,CPYZ,1,CMPZ,1,DECZ,1,ERR,0,INY,0,CMP#,1,DEX,0,ERR,0,CPY,2,CMP,2
,DEC,2,ERR,0
10150 DATA BNE,3,CMPI.Y,2,ERR,0,ERR,0,ERR,0,CMPZ.X,1,DECZ.X,1,ERR,0,CLD,0,CMP.Y,
2,ERR,0,ERR,0,ERR,0
10160 DATA CMP.X,2,DEC.X,2,ERR,0,CPX#,1,SBCI.X,2,ERR,0,ERR,0,CPXZ,1,SBCZ,1,INCZ,
1,ERR,0
10170 DATA INX,0,SBC#,1,NOP,0,ERR,0,CPX,2,SBC,2,INC,2,ERR,0,BEQ,3,SBCI.Y,2,ERR,0
,ERR,0,ERR,0
10180 DATA SBCZ.X,1,INCZ.X,1,ERR,0,SED,0,SBC.Y,2,ERR,0,ERR,0,ERR,0,SBC.X,2,INC.X
,2,ERR,0
```

'Whaddya mean, you sold the last copy?'

No doubt about it . . . bulging eyes, flaring nostrils, face contorted in rage, literally smouldering with frustration.

Another ordinary ST user has missed out on *ST Update.*

Trouble is, in its first few months *ST Update* has been a monstrous success. There's simply no way you can be sure that there'll be a copy for you, unless you order one today.

It's too late after the event. Tearing your newsagent's arm off and beating him to death isn't going to help.

Save yourself the anguish. Just ask him nicely to keep your copy safe each month.

Picture Conversion

Philip Grace

Picture Conversion enables the user to convert pictures from *Degas* or *Degas Elite* to *Neochrome* or 32K screen format, and vice versa. The program is written in *Fast Basic* and is completely Gem driven with all the options available from the menu bar.

Select the source file type and then the object type before clicking on the load picture option. Once a picture has been loaded it is quickly converted and is now ready for saving. At this juncture you can also view the picture currently in memory.

```
REM ****************************************
REM * PIC CONVERSION - BY PHILIP GRACE 1987 *
REM ****************************************
ESCAPE OFF:PROCinit:PROCmenu:END

DEFPROCmenu
RELEASEMOUSE:MENUM$
CHECKITEM40,1:CHECKITEM56,1:ENABLEITEM23,0:ENABLEITEM24,0:ENABLEITEM25,0:EN
TEM26,0
REPEAT:REPEAT
WAITMESSAGE @MES&(0)
UNTIL MES&(0)=10
IF MES&(4)=13 THENPROCdisplay_prog_info
IF MES&(4)=22 THENPROCload_picture
IF MES&(4)=23 THENPROCsave_picture
IF MES&(4)=25 THENPROCview_picture
IF MES&(4)>38 AND MES&(4)<42 THENPROCs_select
IF MES&(4)>55 AND MES&(4)<59 THENPROCd_select
INVERTTITLE MES&(3),1
UNTIL MES&(4)=27
ENDPROC

DEFPROCdisplay_prog_info
BU%=ALERT("[0][ | Picture Conversion | | By Philip Grace 1987 | ][ OK
]
ENDPROC

DEFPROCload_picture
PATH$="A:\"
IFS%=D% THENPROCthe_same:ENDPROC
IFS%=1 THENPROCdegas_load
IFS%=2 THENPROCneo_load
IFS%=3 THENPROCscreen_load
IFBU% THEN
ENABLEITEM23,1:ENABLEITEM25,1:ENABLEITEM39,0:ENABLEITEM40,0
ENABLEITEM41,0:ENABLEITEM56,0:ENABLEITEM57,0:ENABLEITEM58,0
ENDIF:ENDPROC

DEFPROCsave_picture
PATH$="A:\"
IFD%=1 THENPROCdegas_save
IFD%=2 THENPROCneo_save
IFD%=3 THENPROCscreen_save
IFBU% THEN
ENABLEITEM23,0:ENABLEITEM25,0:ENABLEITEM39,1:ENABLEITEM40,1
ENABLEITEM41,1:ENABLEITEM56,1:ENABLEITEM57,1:ENABLEITEM58,1
ENDIF:ENDPROC

DEFPROCs_select
CHECKITEM38+S%,0:CHECKITEMMES&(4),1:S%=MES&(4)-38
ENDPROC

DEFPROCd_select
CHECKITEM55+D%,0:CHECKITEMMES&(4),1:D%=MES&(4)-55
ENDPROC

DEFPROCthe_same
BU%=ALERT("[3][ | The source and | destination formats | are the same | ][ S
LECT ]",1)
ENDPROC

DEFPROCdegas_load
P$=PATH$+"*.PI1":F$=""
GRAB0,0,SCREENWIDTH,SCREENHEIGHT
FSELECTP$,F$,BU%:PROCremove_filename
PUT0,0,3:IFBU%=FALSE THENENDPROC
PATH$=P$:H%=OPENIN(F$)
IFEXT#H%<>32034 AND EXT#H%<>32066 THENPROCalert_one:ENDPROC
PTR#H%=2
FORF%=1TO32:COL%(F%)=BGET#H%:NEXT
GETBYTES#H%,32000,SCREEN%
CLOSE#H%
ENDPROC

DEFPROCneo_load
P$=PATH$+"*.NEO":F$=""
GRAB0,0,SCREENWIDTH,SCREENHEIGHT
FSELECTP$,F$,BU%:PROCremove_filename
PUT0,0,3:IFBU%=FALSE THENENDPROC
PATH$=P$:H%=OPENIN(F$)
IFEXT#H%<>32128 THENPROCalert_two:ENDPROC
PTR#H%=4
FORF%=1TO32:COL%(F%)=BGET#H%:NEXT
PTR#H%=128
GETBYTES#H%,32000,SCREEN%
CLOSE#H%
ENDPROC

DEFPROCscreen_load
```

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◀ continued from page 25

```
P$=PATH$+"*.*":F$=""
GRAB0,0,SCREENWIDTH,SCREENHEIGHT
FSELECTP$,F$,BU%:PROCremove_filename
PUT0,0,3:IFBU%=FALSE THENENDPROC
PATH$=P$:H%=OPENIN(F$)
IFEXT#H%<>32000 THENPROCalert_three:ENDPROC
COL%(1)=$99
GETBYTES#H%,32000,SCREEN%
CLOSE#H%
ENDPROC
DEFPROCremove_filename
WHILERIGHT$(P$,1)<>"\":P$=LEFT$(P$,LEN(P$)-1):WEND
ENDPROC

DEFPROCalert_one
BU%=ALERT("[3][ | This file is not | | a DEGAS picture | ][ OK ]",1)
CLOSE#H%:BU%=FALSE:ENDPROC

DEFPROCalert_two
BU%=ALERT("[3][ | This file is not | | a neochrome picture | ][ OK ]",1)
CLOSE#H%:BU%=FALSE:ENDPROC

DEFPROCalert_three
BU%=ALERT("[3][ | This file is not | | 32000 bytes long | ][ OK ]",1)
CLOSE#H%:BU%=FALSE:ENDPROC

DEFPROCdegas_save
P$=PATH$+"*.PI1":F$="":GRAB0,0,SCREENWIDTH,SCREENHEIGHT
FSELECTP$,F$,BU%:PROCremove_filename:PUT0,0,3:IFBU%=FALSE THENENDPROC
PATH$=P$:H%=OPENUP(F$):IFCOL%(1)=$99 THEN
FORF%=1TO34:BPUT#H%,DC%(F%):NEXT
ELSE
BPUT#H%,0:BPUT#H%,0
FORF%=1TO32:BPUT#H%,COL%(F%):NEXT
ENDIF:PUTBYTES#H%,32000,SCREEN%:CLOSE#H%
ENDPROC

DEFPROCneo_save
P$=PATH$+"*.NEO":F$="":GRAB0,0,SCREENWIDTH,SCREENHEIGHT
FSELECTP$,F$,BU%:PROCremove_filename:PUT0,0,3:IFBU%=FALSE THENENDPROC
PATH$=P$:H%=OPENUP(F$):IFCOL%(1)=$99 THEN
FORF%=1TO128:BPUT#H%,NC%(F%):NEXT
ELSE
FORF%=1TO4:BPUT#H%,0:NEXT:FORF%=1TO32:BPUT#H%,COL%(F%):NEXT
FORF%=37TO128:BPUT#H%,NC%(F%):NEXT
ENDIF
PUTBYTES#H%,32000,SCREEN%:CLOSE#H%
ENDPROC

DEFPROCscreen_save
P$=PATH$+"*.*":F$="":GRAB0,0,SCREENWIDTH,SCREENHEIGHT
FSELECTP$,F$,BU%:PROCremove_filename:PUT0,0,3:IFBU%=FALSE THENENDPROC
PATH$=P$:H%=OPENUP(F$):PUTBYTES#H%,32000,SCREEN%:CLOSE#H%
ENDPROC

DEFPROCview_picture
BU%=ALERT("[1][ | Picture will remain | on the screen until | the  space  bar  i
s | pressed ... ][ OK ]",1)
TAKEMOUSE
BLIT @SM&(0),0,0,SCREENWIDTH,SCREENHEIGHT,@DM&(0),0,0,3
REPEAT:Z%=GET:UNTILZ%=32:RELEASEMOUSE:CLG3:MENUM$
ENABLEITEM23,1:ENABLEITEM25,1:ENABLEITEM39,0
ENABLEITEM40,0:ENABLEITEM41,0:ENABLEITEM56,0:ENABLEITEM57,0
ENABLEITEM58,0:CHECKITEM38+S%,1:CHECKITEM55+D%,1
ENABLEITEM24,0:ENABLEITEM26,0
ENDPROC

DEFPROCinit
OU%=OUTHANDLE:CLOSEWINDOU%:DELETEWINDOU%
M$="[ Picture Conversion ]"
M$=M$+"[ File | Load Picture \ Save Picture \--------------\ View Picture \-----
---------\ Exit Program ]"
M$=M$+"[ Source |  Degas (Elite) \  Neochrome \  Screen (32000 Bytes) ]"
M$=M$+"[ Destination |  Degas (Elite) \  Neochrome \  Screen (32000 Bytes) ]"
DIMMES&(7)
DIM NC%(128),DC%(34),COL%(32)
DIMSM&(9),DM&(9)
S%=2:D%=1
TXTRECT0,0,SCREENWIDTH,SCREENHEIGHT
GRAFRECT0,0,SCREENWIDTH,SCREENHEIGHT:CLG3
RESERVE SCREEN%,32000
FORF%=1TO128:READNC%(F%):NEXT
FORF%=1TO34:READDC%(F%):NEXT
SM&(0)=SCREEN%>>16:SM&(1)=SCREEN% AND $FFFF:SM&(2)=SCREENWIDTH
SM&(3)=SCREENHEIGHT:SM&(4)=SCREENWIDTH>>4:SM&(5)=0
SWITCH SCREENMODE
CASE 0:SM&(6)=4:DM&(6)=4
CASE 1:SM&(6)=2:DM&(6)=2
CASE 2:SM&(6)=1:DM&(6)=1
ENDSWITCH
SM&(7)=0:SM&(8)=0:SM&(9)=0
DM&(0)=PHYSBASE>>16:DM&(1)=PHYSBASE AND $FFFF:DM&(2)=SCREENWIDTH
DM&(3)=SCREENHEIGHT:DM&(4)=SCREENWIDTH>>4:DM&(5)=0
DM&(7)=0:DM&(8)=0:DM&(9)=0
ENDPROC

REM --- NEO DATA ---
DATA0,0,0,0,0,0,7,0,7,48,7,80,7,112,4,112,0,112,0,117,0,119,0,87,0,39
DATA0,7,5,7,7,7,7,4,7,119,32,32,32,32,32,32,32,32,48,32,32,32,127,30
DATA0,0,0,0,0,0,0,0,1,64,0,200,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
REM --- DEGAS DATA ---
DATA 0,0,7,119,7,0,0,112,7,112,0,7,7,7,0,119,5,85,3,51
DATA 7,51,3,115,7,115,3,55,7,55,3,119,0,0
```

Angle Print

Graham Russell

Print at angle on the screen with this handy QL utility. The syntax for the procedure is APRINT y co-ord, x co-ord, angle, text.

```
100 DEFine PROCedure aprint (pd,pa,an,a$)
110 LOCal l,va,vd,n
120 l=6*LEN(a$)
130 va=COS(RAD(an)) :vd=SIN(RAD(an))
140 va=va*l/3.5 :vd=vd*l/5
150 FOR n=1 TO LEN(a$) :CURSOR pa,pd :PRINT a$(n) :
    pd=pd-vd :pa=pa+va
160 END DEFine
```

Blackout

John Durst

This small Amstrad CPC utility will allow the user to quickly blank off the screen, by use of the interrupt, EVERY command. The routine checks the CONTROL/TAB keys and if they are depressed toggles the first two inks and the border between zero and their normal value.

```
1 EVERY 20 GOSUB 65530
10 PRINT TIME:GOTO 10
20 REM
       Line 10 is just a dummy: your pro
       -gram would be merged here.

65530 IF INKEY(68)<>128 THEN RETURN
65531 ik=NOT(ik)
65532 INK 0,ABS(ik)
65533 INK 1,24*ABS(ik)
65534 BORDER ABS(ik)
65535 RETURN
```

Screen Swap

Gareth L Perkins

Swap around two screens that are held in memory with this Amstrad CPC utility. The first screen is held at &4000 with the second one residing at &C000. To swap them around simply use :SWAP SCREEN.

```
10 REM **Swap Screen** by Gareth L. Perkins
20 REM
30 MEMORY &A4FF:CALL &BBFF:MODE 2:PEN 1
40 FOR addr=&A500 TO &A531:READ b$:POKE addr
,VAL("&"+b$)
50 cs=cs+PEEK(addr):NEXT
60 IF cs<>&12E9 THEN PRINT "DATA Error!":STO
P
70 CALL &A500:PRINT "|SWAP.SCREEN installed.
":END
80 DATA 01,09,A5,21,0E,A5,C3,D1,BC,12
90 DATA A5,C3,1E,A5,00,00,00,00,53,57
100 DATA 41,50,2E,53,43,52,45,45,CE,00
110 DATA 3A,30,A5,FE,C0,3E,40,CA,2A,A5
120 DATA 3E,C0,32,30,A5,C3,08,BC,C0,00
```

Attention!

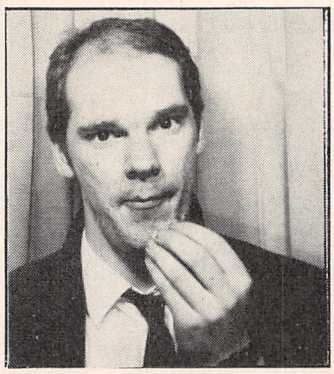
Unfortunately due to the sheer volume of submissions our returns department has been unable to cope satisfactorily. So, from now on we are requesting that you include a suitable stamped addressed envelope for return of your submission. Not enclosing a suitable SAE will mean that your program will not be returned. You have been warned.

The beneficial side of this system is that 90% of submissions will be returned within one week. A small price to pay for such a service I'm sure you'll agree.

With regards to future submissions we are looking for articles on programming in general, utility programs and applications software and lastly, good games. Here are a few types of program we don't want: Educational, hangman, pools predictors, mastermind, flashing borders, bank accounts, disc catalogues and clocks.

If you can't get a program listing in the magazine to work ring in to see whether it was faulty rather than writing. If there were problems then we'd let you know. Corrections normally appear a couple of weeks later. Thanks.

Duncan Evans
Technical Editor



with Kenn Garroch

Enterprise to ST hook-ups

S Perrin, of New Parks, Leicester, writes:

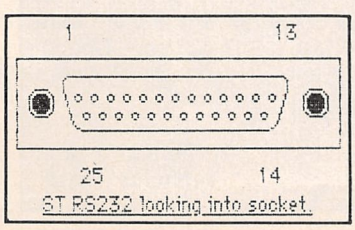
Q I have just acquired an Atari 520 STFM and I am using it with a Sony Trinitron Monitor KV-1440 UB which is fitted with a SCART socket. I read your article about wiring the ST to an Amstrad Monitor and I would like to know the pin sequence for the Sony input. I have an Enterprise Computer as well, and wonder if you can tell me how that wires up to the Sony.

Another problem: is it possible to hook up the ST to the Enterprise through the RS232 port, even though the Enterprise is RS432? The Enterprise pin out is:

A1 Offset ground
A2 NC
A3 RTS
A4 CTS
B1 0V
B2 NC
B3 Data out
B4 Data in

A I am sorry but I have no idea about the SCART plug, and since there must be at least 21 pins, there is not a lot of use trying to guess. All I can do is make my usual plea to any readers who may know.

Your second question is easier to answer, setting up communications between the ST and the Enterprise is simply a matter of connecting the following lines:



ST RS232 looking into socket.

ST	Enterprise
2 TX	B4 Data in
3 RX	B3 Data out
4 RTS	A4 CTS
5 CTS	A3 RTS
7 SigGnd	B1 0 Volts

and having a terminal program running at either end. Match the baud rates, word lengths, stop bits, and parity, and away you go.

A robotic truth table

Michael Tilling, of Leighton Buzzard, Beds, writes:

Q I am in the process of designing a computer controlled robot for my A Level Technology project, but I have recently come up with a couple of questions regarding the TTL and CMOS range of ICs. I wonder if you could help.

I intend to drive the robot's stepper motors from the printer port of a BBC micro through a logic network to obtain the required outputs. The truth table is shown in figure one.

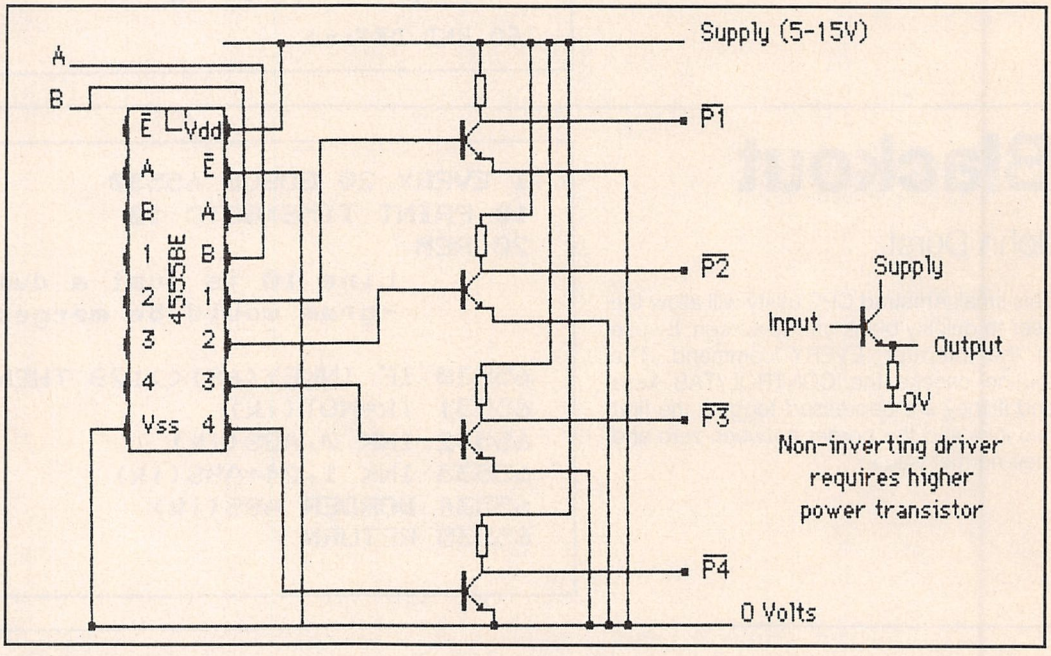
Figure One

B	A	P1	P2	P3	P4
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

Figure Two

B	A	P1	P2	P3	P4
0	0	0	1	1	1
0	1	1	0	1	1
1	0	1	1	0	1
1	1	1	1	1	0

I've been told that if I want to build a logic network from TTL ICs I will need to use negative logic (figure two), since the TTL's design means that it is good at sinking current but useless at sourcing current. Is this true or doesn't it matter. What logic would you use? Also, if negative logic has to be used, will the circuit remain unchanged?



A The current output of TTL chips should not really be your main concern since they should not be used to directly drive stepper motors. What you need to drive is a transistor that in turn drives the motor.

In this case, you would be better off using CMOS technology, since it consumes much less power and generally does not require any external resistors or capacitors. In practice, it is generally a matter of personal preference, and mine was always CMOS since it is more flexible.

There are a couple of ways to implement the truth table you have given. The first is to design a logic decoding system as you suggest, the second is to use a purpose built decoder such as the 4-bit demultiplexer chip, the 4555BE. This gives the result shown in your figure one, and can be used as shown in the example circuit diagram.

There are two ways of using transistors to drive the stepper motors, firstly in the inverting format. Here, a one input to the base of the transistor turns it on, and pulls the output low, a zero in the base turns it off and allows the resistor to pull the output high. The advantage of this configuration is that most of the power goes through the resistor allowing a cheaper transistor to be used.

Alternatively, the non-inverting circuit can be used, the only problem being that the transistor, since all of the power to the motor goes through it, needs to be high power.

If you want to use the inverting configuration and have non-inverting output then use a 4011 4×nand gate chip to get four cheap inverters for the outputs of the 4555.

One of the main things about logic circuit design is to use the simplest circuit possible and keep the chip count as low as possible. To design a logic system using n/and/or gates to perform the same function uses more chips and is therefore less efficient (though it is good practice to do the design anyway).

Colour blindness

S D Marchant, of Innsworth, Gloucester, writes:

Q I would be grateful if you, or your readers could throw any light on the following problem.

I have an Amstrad CPC 6128 microcomptuer with a monochrome monitor. I have recently tried connecting the micro to a Saisho colour television via the RGB socket.

The picture, although recognisable, seems distorted with the colour intensities all wrong. Does this have any-

thing to do with the two different types of RGB that you have mentioned in past issues, and if so, is it possible to convert the signal formats?

PS An Acorn Electron does work with this TV set (RGB).

A Looking at the problem backwards, I know that the Amstrad colour monitor works with the BBC micro in RGB mode, and since this is the same as the Electron, things should work the other way around. That is, a monitor that works with the Electron, should work with the 6128.

However, a quick examination of the connections on the BBC and the Amstrad reveal that the centre pin in the former is tied high (5 Volts). The Amstrad manual says that this is the LUM input and although it is not, as far as I know, used on the Amstrad monitor, it may well be that it is on the Saisho. You might try examining the Saisho manual to see if it says anything about this pin, if not, try setting it to 5V or GND to see if it makes any difference, it may need to be tied either way.

It is quite possible that I have got the whole thing wrong, and some of our readers know better.

If so, please let me, and S D Marchant, know.

The origin of numbers

Andrew Cook, of Clifton, Bristol, writes:

Q I have a query which concerns the machine code utilities for the Commodore 64 that use the SYS 49152 command to start them. You published a few in Bytes and Pieces and I was wondering where the numbers in the data statements come from and how I could obtain these numbers in order to write my own programs – perhaps to send in.

A All routines that are accessed via the SYS command are machine code programs. They use numbers that are instructions and data for the 6510 microprocessor in the C64.

These numbers appear in the data statements since this is the easiest way to transfer machine code from computer to computer via the paper medium (magazine pages to you and me).

The first number in the sequence is always a code for an instruction to the microprocessor, and it tells it to do something. The 6510 has quite a number of these codes, each of which denotes a specific instruction.

Each instruction is usually something simple such as load the accumulator register with the next number in memory, ie, LDA #10 in assembly language or 169, 10 as machine code numbers.

The 6510 is virtually identical to the 6502 µprocessor and has the same machine code instruction numbers, the difference between the two being that the 6510 has some extra memory control lines built in. Writing machine code is usually done with mnemonics – short words that remind you of what they mean. For instance:

```
LDA #10
STA 49160
RTS
```

is a machine code program that loads 120 into the internal A register or accumulator with the LDA #10 instruction, then stores A at memory location 49160 with STA 49160. The RTS means return from subroutine and is used because SYS treats machine code programs as though they were subroutines so, normally, RTS is put at the conclusion of every machine code routine.

Inside the 6502 there are three registers, A, X, and Y. The A or Accumulator is used as a general purpose store, and receives the results of all operations such as ADC (Add with carry) and ROR (Rotate right one place). Machine code uses these registers to perform operations and load and store memory allowing programs to be written.

There are two ways of writing machine code programs, by hand, and with an assembler. The first of these is quite arduous and time consuming since once the program has been written down with the mnemonics, it has to be 'assembled' into the numbers that the microprocessor can understand.

It can be done using a 6502 manual such as the *6502 User's Manual* by J J Carr, published by Prentice Hall.

Each of the mnemonics is converted into its numerical form, and then placed into a data statement in sequence. A FOR . . . NEXT loop is then used to place this into memory at the correct position – it is then called via SYS. For example, take the program above:

It starts at 49152, so

Mem	Opcode	Operand	Numbers
49192	LDA	#10	169,10
Load accumulator with 10			
49154	STA	49160	141,8,192
Store A at 49160			
49157	RTS		96
Return to Basic			

The Basic loader would therefore be:

```
10 FOR T=49152 TO 49157
20 RBAD A:POKE T,A
30 NEXT
40 SYS 49152
50 DATA 169,10,141,8,192,96
```

When writing programs this way select the start location of the program, in this case, 49152.

Each instructions (opcode) now takes up one byte, and each argument (operand) takes one or two depending on its size. So, the first is LDA #10. The # means immediate data, ie, that in the next memory location so this assembles as 169,10.

The first is in 49152, the second in 49153. The next instruction is STA at a memory location (non-zero page, ie, greater than 255) so this is 141 and goes at location 49154.

The address at which A is stored is split into two bytes since each memory location can only hold a number from 0–255, the first being the remainder after dividing by 256, the second being the number of times 256 goes into the number.

In this case 49160=8, 192, ie, (192*256)+8. These two numbers go in the next available locations in the program, ie, 49155 and 49156. The RTS instruction is one byte, and has no arguments, so 96 goes in 49157.

This completes the program, and the Basic loader can be set up to read the data, made up from the numbers found: 169,10,141,8,192,96 and the FOR . . . NEXT loop counter cis used as the pointer that tells POKE where to put the number in memory.

SYS 49152 then jumps the microprocessor to the number at 49152 and it tries to execute it which it can since it tells the processor to load its accumulator from the next memory location.

As you can see, this is rather a messy process, and very mechanical, especially when it comes to working out jumps and branches.

A program called an assembler can be used to perform all of these tasks and generate the numbers needed to form the program.

Assemblers also allow the program to be placed in memory at its correct location as well, though this task is sometimes left to a special program known as a loader.

Whichever way the loading is done, the result is a machine code program in memory which can be executed with a SYS command to its first instruction.

Converting assembler programs into a paper media form can be done with the following Basic program.

```
10 PRINT "ENTER THE START ADDRESS OF THE CODE"
20 INPUT S
30 PRINT "ENTER THE END ADDRESS"
40 INPUT E
50 FOR T=S TO E
60 PRINT PEEK(T);",";
70 NEXT
```

Write down the numbers produced by the program and then place them into data statements in a loader program as above.

It is possible to make the computer create data statements that it will automatically add to the program, but then program and the ideas behind it are a little too involved to explain here – perhaps in the future.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Kenn Garroch and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, 12-13 Little Newport Street, London WC2H 7PP.

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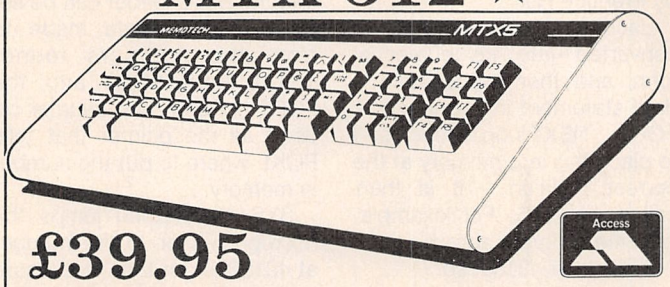

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Crackers and Hackers

Graham Edkins suggests some areas of Compunet you may like to sample, including Crackers and Hackers, and Party Line.

With Compunet moving to its new mainframe recently, its Email service, Courier, was unavailable for a while. Now that it has returned there seems to be twice as many letters coming into my mailbox (GE81). Amongst a recent batch was a message from Dave (DJP2) to gently remind me to have a look at an area which he is one of the editors of.

I had fallen into the trap of thinking that with a directory uploaded in the Arcade Avenue of the Zap Club and calling itself Crackers and Hackers it would be full of things like second rate demos with 'borrowed' games music and had therefore never taken the trouble to look.

I was therefore very pleased to see that my original supposition had been far from the truth. The Crackers and Hackers area works under the title 'For Users Who Want To Do More Than Just Play Games' and it's edited by NGT1, JN5 and DJP2 with further help from PF5, GMW2, RB30 and IG4. They don't have a fancy header for their area but they do have a couple of Alpha Goto's which are C + H and C + H1 for the second directory.

From C and H there are many sub-directories, the first of which is the Transfer Club which offers advice and help in making a disc backup of tape-based games. They make special notice that help is only at hand for tape to disc, presumably to avoid any charges of helping people make illegal copies of their software.

The Poker club is a cleverly named area for listing various Pokes (all shown in hexadecimal) to cheat your way through popular games. Reviews of games are held in the C and H Clapper Board directory which has spawned a further sub-directory for hardware reviews. In the Gossip Shop you can find news, opinions (Sometimes controversial) on computing and communications topics.

Users are encouraged to upload into the swap shop and adverts areas which both contain small ads for computer products and software. Help Line is useful for anyone with a computing problem; just put a message up and if none of the C and H team can help then there is always a good chance that one of its readers can. Another space for your uploads is the game demos/art area which some people may feel gives them a better chance of being noticed than in the main Compunet demos area.

C and H also has a free utilities area and a sprite section which holds a free sprite editor and pre-designed sprites ready to drop into your latest game. The latest addition is the 'Parallel Dir', which is all set to become an area in its own right as it already has sections for news, hints and tips and utilities.

Crackers and Hackers is not an exception on Compunet. There are many areas which have grown to an extent where you can spend all of one online session without seeing anything else. Most of the areas are non-profit making for the uploaders because they very rarely add a charge to any of their frames. Their motives are more to do with the fact that Compunet is one of the few chances that exists to run, edit and write areas which can be read by thousands of people, even going to the expense and problems of starting your own bulletin board is very unlikely to achieve such a large readership.

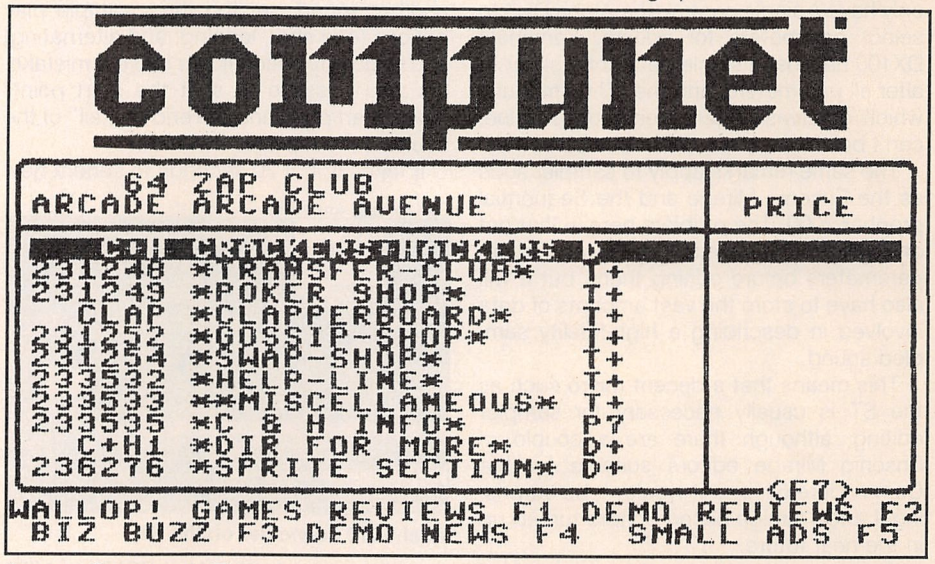
Another service offered by many databases is a chatline which gives users the opportunity to talk via their keyboards to each other anywhere in the country. The ability on Compunet to download linking software while online makes their chatline (GOTO PARTY) the best available in the UK because it is not confined to any of the screen format constraints of the main system.

The special link software cost 50p per usage until recently, when this charge was removed. Party Line now has just the extra connect charge of £1.00 per hour.

Once you have linked to Party Line you are given a choice of options in the duckshoot, STORE to save your chat session to disc or tape, LEAVE to quit the area, and CHAT.

Selecting CHAT removes the duckshoot and opens up two windows, the upper with the chat scrolling up and off the screen and the bottom window, where you type any messages that you wish to send.

A third window can be brought down to scroll back through any chat that you may have missed due to the speed at which it works. Up to 22K of chat may be reviewed in this fashion.



Changing names

There are other functions available all of which are pre-fixed with a asterisk, these are *ALIAS XXXX which will change your name which appears with each message, *ENTER XXXX which allows you to move from your current room into anyone of eight others (if the room name does not exist it is also created by this command), *WHO which lists all the Party Line users there alias and room, CALL XXXX to tell another user that you wish him to join you in your room, and finally DICE which can used within Dungeon & Dragon games to generate random numbers.

If you have never entered Party Line or have only ever used it with the old Plain Link then I strongly recommend that you try it, especially now that the Special Link is free.

Editing without tears

Mark Jenkins discusses the problems of finding a sound editor powerful enough for your synthesiser.

As we've seen many times in the past, one of the most useful musical applications for your micro takes advantage of its built-in memory and controls to supplement the abilities of modern synthesisers. Cost-cutting often robs these instruments of their control panels, output displays and memory, leaving the user with a powerful synth which is disappointingly hard to edit.

Roland's Alpha Juno synths, for example, only have a single control (the Alpha Dial) to select parameters for editing. Yamaha's DX100 has just a single data entry slider to alter all parameters, and the FB-01 module, which otherwise offers tremendous value, can't be edited at all – without a computer.

The same remarks apply to sampler such as the Ensoniq Mirage and the Sequential propher 2000. The problem here is that not only will a micro have to store a set of synth parameters before editing them, but it will also have to store the vast amounts of data involved in describing a high-fidelity sampled sound.

This means that a decent micro such as the ST is usually necessary for sampler editing, although there are a couple of Ensoniq Mirage editors suitable for the Commodore 64, and it wouldn't be surprising if a few Amiga-based editors turned up in the near future.

If you want a reasonably priced Midi sampler to add to your micro, the Akai S612 is available at bargain prices – around £399 with a Quick Disk drive. Its six-note polyphonic and tremendously fast and simple to use, whether you want to play sounds from its own library or make your own samples. But the S612 would certainly benefit from more complex editing facilities, and it's taken a while for a suitable package to turn up.

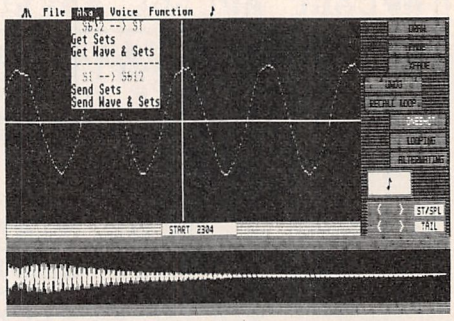
It's being imported by Syndromic and comes from Drumware's *Soundfiler* range, which also includes editors for the Akai X7000/S700, Akai S900 and Casio FZ-1 and *Gen Wave,* a generic sample editor which should work with any sampler conforming to the latest Midi sample dump standard.

The S612 sampler just has two sliders on its front panel which allow you to set a start and end point for the sample and decide whether the sound loops between these points. The sliders aren't tremendously accurate and the loop options are far from comprehensive.

Soundfiler runs in monochrome or medium resolution colour and will load a default set of parameters for sample playback unless there's already something in your sampler's memory. Two sample files labelled WAV are supplied and these are a marimba and a synth-like Sweep.

If you load one of these sounds its waveform is displayed in closeup and in longshot on the computer screen; you can very easily draw in new sections of the sample using the mouse (useful for removing clicks). Fade at any point, crossfade to another sound, set the three sample play options (one shot, looping, and alternating) and undo any action if you make a mistake. It's also possible to shift the start point/splice start point and the end or "tail" of the sound quite rapidly.

It takes about 20 seconds to send a new



Akai S612 *Soundfiler* on the ST

sample across to the Akai S612 via MIDI, but only a couple of seconds to send a new set of modified parameters including loop points. The file options are pretty straightforward, while the "Akai" options simply allows you to transfer either sample data, or sample data with other settings, to or from the S612.

The voice option is a little less obvious; it indicates the availability of between one sound (on a 520ST with several desk accessories in place) and six sounds (on a 1040ST with none), any of which can be selected for transfer to the Akai. You can move voices around so that the sound you want is loaded from voice one as a default when the program starts up.

Under the next option, Function, you're offered EQ, loop, envelope and knobs. EQ allows you to set a peak, band or notch filter with high or low cut off for the sample, with variable resonance and frequency. This is a facility which isn't available on the S612 itself, which just has a low-pass tone control, and so could add a lot of versatility to your sounds.

You can undo the EQ at any time, and the option to play a note on the S612 exists on this page, as it does on the main loop page and on the envelope page, which again offers options not available on the S612 alone. You can reverse, invert phase, insert, merge, replace and copy using portions of the total sound, and this page allows you to combine parts of two different sounds if desired.

Overall volume

You can draw your own volume envelope (impossible on the S612 alone) and increase the overall volume to the maximum possible before distortion occurs, which is handy for minimising the effect of hiss in a sample.

"Knobs" simply duplicates the vibrato speed/depth/delay, filter, release, total tune, loop mode and mono/poly controls on the sampler itself, adding a Transpose value from –24 to +39 semitones. The last section – identified just by a musical note at the top fo the screen – brings up a keyboard display which allows you to set any note with any velocity to be played from the computer, and also allows you to set high resolution (slow waveshape drawing) or low resolution (fast waveshape drawing) for all the waveform displays.

The *Soundfiler* handbook is extremely well written and acts as a guide to sampling techniques in general as well as a reference work for the software.

It points out that you can create fuzz, flanging and echo effects with careful use of various *Soundfiler* options, explains crossfade looping and the ways in which this can smooth very different sounds together, and generally answers most of the questions you may have about operating the package.

Soundfiler isn't the most inexpensive package in the world at just over £150, but it does add an enormous amount of power to your S612. It doesn't make it multi-timbral like the S700/S900 and X7000 units, but it does allow you to improve the quality of loops and splices, join together bits of different samples (for instance, putting a timpani on the start of an orchestral crash) and modify your sounds in ways which are not available on the S612 alone.

In other words, *Soundfiler* makes the inexpensive S612 a much better proposition if you want a polyphonic sampler to add to your ST.

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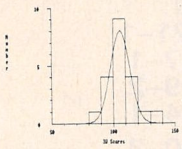

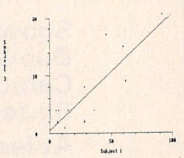

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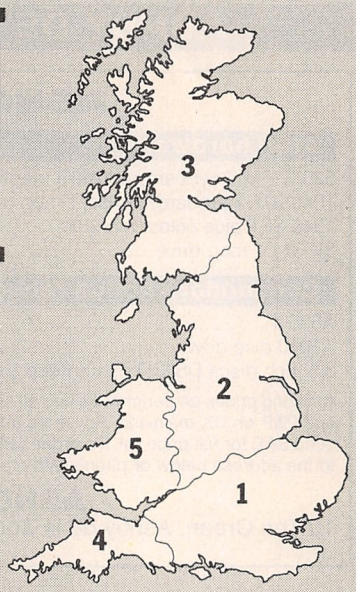

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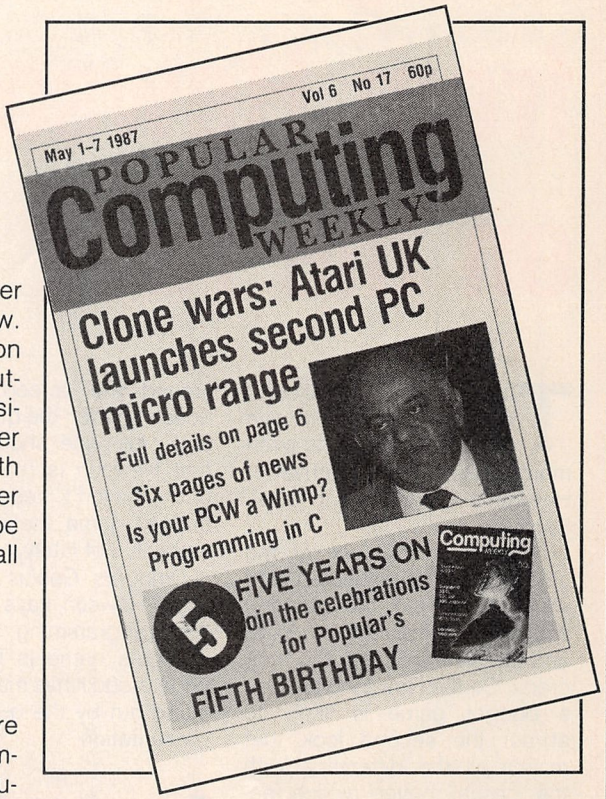


Programs

Technical editor Duncan Evans relies on you for the programs section. It needn't be that machine code masterpiece that NASA was promising you vast sums for, what we're looking out for is handy routines, utilities, anything that you've concocted that makes your life easier as a programmer that you'd like to pass on to others.

Don't make your programs too long, please – it's best if we can print the full listing in one week, and a four part listing is probably the largest we can accept. If they're very short, then so much the better, they'll fit neatly into our Bytes and Pieces page.

Features

We're also particularly interested in articles about programming, which should be sent to Christina Erskine. If you think you could explain technical areas of computing to a wider audience then do let us know.

We also welcome articles on any aspect of home computing, although we cannot feasibly accept anything longer than 2000 words. It's worth checking by phone or letter first that your piece will be suitable, but we're open to all ideas.

Money no object?

If it's not the money you're interested in so much as simply having your say, the Ziggurat slot is where anyone can get up on a soap box and air their opinions. Your article should be 600–650 words long. We pay £15 per Ziggurat published.

For even less money, we'd like to hear your views, comments and opinions on our Letters page, and our columnists are always on the look-out for hints and tips and comments on their own areas of the magazine.

Mark Jenkins welcomes correspondence of a musical nature for Soundcheck, Martin Bryant is interested in any queries or views regarding computer chess, and our communications correspondents will be happy to answer questions about modems and networks (mark your envelope 'Comms').

Any technical or programming problems you're encountering can be addressed to Kenn Garroch. Kenn tries to help as many people as possible in Peek and Poke, but cannot undertake to give personal replies.

How to submit

For features, it is almost always better if you write or telephone first to discuss your ideas with us. Your articles should be typed or word processed, preferably in double spacing, using one side of the paper only.

Please don't write more than 2000 words for an article. Program notes should explain what your program achieves and how it works, but, again, please keep them concise.

Payment

Listings will be paid at a rate of £25 per published page, Bytes and Pieces at £10 each. For feature articles, we pay £40 per published page, which is about 800 words.

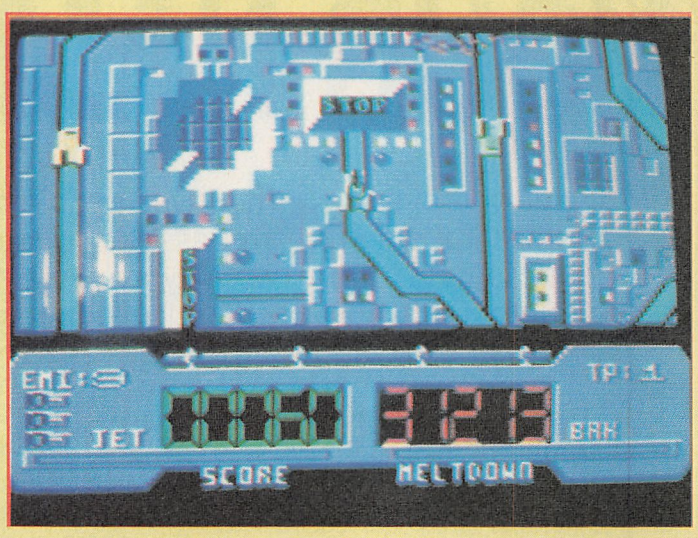
Your payment should arrive six weeks after publication date.

Where to send them

All submissions should be sent to *Popular Computing Weekly,* 12–13 Little Newport Street, London WC2H 7PP. If you mark which department your letter is destined for on the envelope it will help us process them much more quickly.

We will make every attempt to acknowledge receipt of your submission.

Budget games from Hewson on the rack



The scramble for a slice of the increasingly attractive budget market gets even more frantic with the arrival of Hewson's new budget label, Rack-It.

Hewson is now one of the oldest and most respected software houses in the country, with hits like the recent *Exolon* and last year's *Uridium* to their credit. So the Hewson name on a budget game is likely to attract the second look that makes all the difference with the casual buyer (which accounts for the majority of budget sales).

Mastertronic is in on the deal too, since they're doing the marketing for the new label. Its involvement should ensure wide availability for the Rack-It titles.

Let's not overlook the games themselves though. The first Rack-It releases should reach the shops this coming week, and we've had a look at three of them: *Draughts Genius, Sunburst* and *Anarchy*.

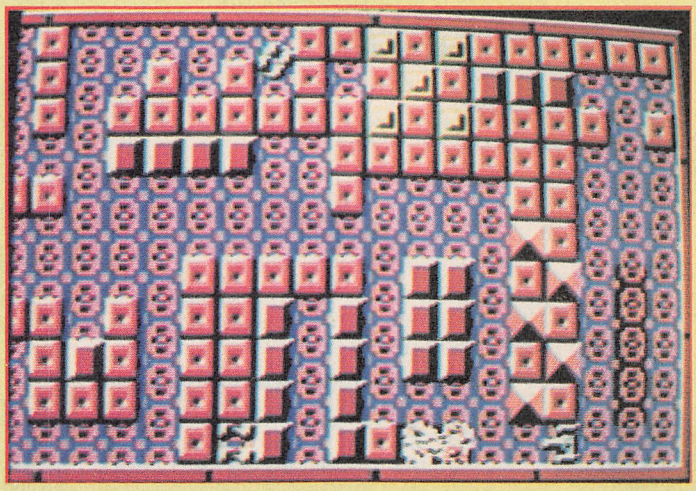
Sunburst is marginally the least impressive of the three, though it's still as good as any recent budget shoot 'em up that I've played.

You control a small spacecraft flying towards a star which is surrounded by various rocky formations. From these, a number of aliens launch themselves into space as they attempt to prevent you reaching your goal.

Killing the aliens allows you to build up your energy stores, and when these are high enough you launch an attack on the star itself.

For some reason the programmers have fixed the ship in the centre of the screen, with the landscape moving beneath it, and this isn't as effective as a ship that can move freely around the screen. *Sunburst* doesn't match the quality of the slick, full-price shoot 'em ups that Hewson is renowned for, but I haven't seen a similar budget game that beats it – certainly not lately.

Draughts Genius is what it says. Hewson says that since the programming behind a draughts game is fairly easily understood it has made this one stand out by the quality of the presentation.



The board is shown in 3D perspective, with an animated representation of Albert Einstein as your opponent, staring thoughtfully at the board.

You can choose to play against the computer or another player, or watch the computer play against itself. The game offers eight levels of play, and begins playing a very competitive game at around level four.

People raised on frantic arcade games might not think much of playing draughts but this is the best version of the game that I've ever seen on the Spectrum.

Anarchy is the one that got me hunched over the joystick wanting 'just one more go'. It's a very simple shoot 'em up set in a maze, and with an element of strategy.

The purpose of the game is to guide your tank around the maze (a security complex according to the inlay, but the plot doesn't really matter).

Along the way you have to destroy a number of blocks (fuel dumps), and when all these have been eliminated you can go onto the next level.

The tricky part is that you can only fire at the blocks from a short distance away. If you're directly adjacent to one your fire has no effect.

This means that you have to position yourself in such a way as to allow you to destroy the maximum number of blocks in the shortest period of time.

It isn't as easy as it sounds, especially since you're playing against a two minute time limit, but it's the sort of game that teasingly lets you get close to achieving your target so that you can almost – but not quite – finish within the time limit.

And once the old 'I'm sure I'll be able to finish if I have one more go' syndrome sets in then you're hooked.

So, a good start to Hewson's budget venture. The least of the games is as good as most of the competition, and the best is simple but infuriatingly addictive. If the standard remains this high then budget labels like Codemasters, Firebird and Mastertronic itself will have to work hard to keep up. And, with luck, that competition will work in our favour and cause the standard of budget games to be raised even higher.

Cliff Joseph

"Anarchy is the one that had me hunched over the joystick wanting 'just one more go'"

Program *Draughts Genius* **Type** Simulation **Micro** Spectrum.
Program *Sunburst* **Type** Arcade **Micro** C64.
Program *Anarchy* **Type** Arcade **Micro** C64.
All Rack-It titles are priced at £2.99, available from Rack-It, 8–10 Paul Street, London EC2A 4JH.

Your complete guide to all the software released this week

Amstrad CPC

Program *Shard of Inovar* **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Amstrad PCW

Program *Supertype II* **Type** Application **Price** £24.95 **Supplier** Digita International, Kelsey House, Barns Road, Budleigh Salterton, Devon EX9 6HJ.

A selection of eight new fonts which can be used in conjunction with *Locoscript 1* and *2*, as well as a variety of CP/M software.

Atari XL/XE

Program *Storm* **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Program *On Cue* **Type** Sport simulation **Price** £2.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Commodore C16/Plus 4

Program *On Cue* **Type** Sport simulation **Price** £2.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Commodore 64

Program *Shard of Inovar* **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Program *Arcade Classics* **Type** Arcade **Price** £1.99 **Supplier** Firebird, 64–76 New Oxford Street, London WC1A 1PS.

Program *Onfield Football* **Type** Sports simulation **Price** £2.99 **Supplier** Firebird, 64–76 New Oxford Street, London WC1A 1PS.

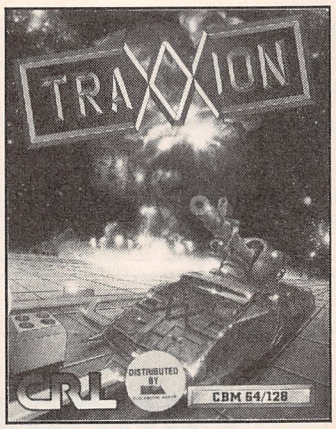
Program *Cagematch* **Type** Arcade **Price** £1.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Program *On Cue* **Type** Sport simulation **Price** £2.99 **Supplier** Mastertronic, 8–10 Paul Street, London EC2A 4JH.

Program *World Tour Golf* **Type** Sports simulation **Price** £9.95 tape, £12.95 disc **Supplier** Electronic Arts, Langley Business Centre, 11–49 Station Road, Langley, Nr Slough, Berks SL3 8YN.

Program *Traxxion* **Type** Arcade **Price** £9.95 tape, £14.95 disc **Supplier** CRL, CRL House, 9 King's Yard, Carpenter's Road, London E15 2HD.

Despite the barely literate and gushingly purple prose on the inlay, *Traxxion* turns out to be quite a good shoot 'em up. But £9.95 is a little steep though.



Program *Plasmatron* **Type** Arcade **Price** £9.95 tape, £14.95 disc **Supplier** CRL, CRL House, 9 King's Yard, Carpenter's Road, London E15 2HD.

Program *Scary Monsters* **Type** Arcade **Price** £7.95 tape, £12.95 disc **Supplier** Firebird, 64–76 New Oxford Street, London WC1A 1PS.

An arcade adventure, featuring an island full of monsters pinched from Hollywood horror films, and you as the hunky hero who sets out to rescue the hapless heroine.

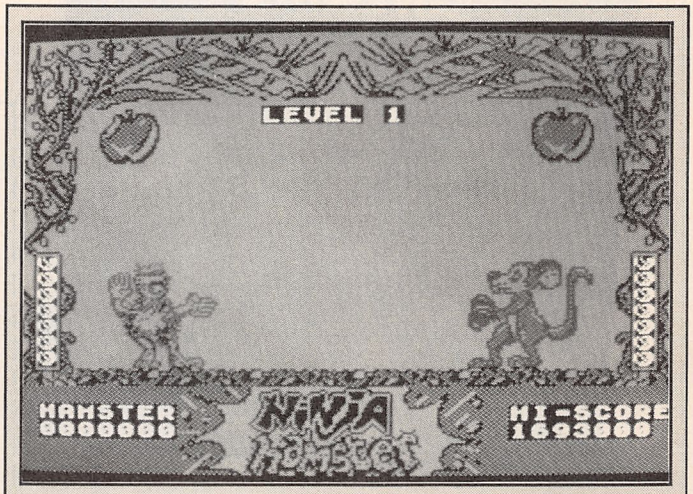
Program *Lords of Conquest* **Type** Strategy **Price** £9.95 tape, £12.95 disc **Supplier** Electronic Arts, Langley Business Centre, 11–49 Station Road, Langley, Nr Slough, Berks SL3 8YN.

An award-winning strategy wargame, rather like the board game, Risk. It also includes a map generator allowing you to design your own maps to play on.

Commodore Amiga

Program *Deluxe Paint II* **Type** Utility **Price** £69.95 **Supplier** Electronic Arts, Langley Business Centre, 11–49 Station Road, Langley, Nr Slough, Berks SL3 8YN.

continued on page 45 ▶



Any game with a title like *Ninja Hamster* has to be worth a look, but unfortunately the title is probably the most noteworthy thing about it.

***Ninja Hamster* returns from his hamster 18–30 holiday to find his village terrorised by Sinister Rat and the Lizards of Death. Fortunately Hamster is a master of the martial arts, and so he vows to free the village from their tyranny.**

Not surprisingly, *Ninja Hamster* is an addition to the ranks of martial arts games, but only the novelty of having a hamster as the hero makes it different from any other kung-fu kick 'em up. Once you get over that novelty the game is pretty average.

Hamster (who looks more like a demented cotton wool ball than a mammal of any sort) faces a series of eight opponents who have to be loaded into the game two at a time in the 48K version, or all at once in the 128K version on the flip side of the tape. These opponents can be controlled by the computer or by another player if you've got one handy.

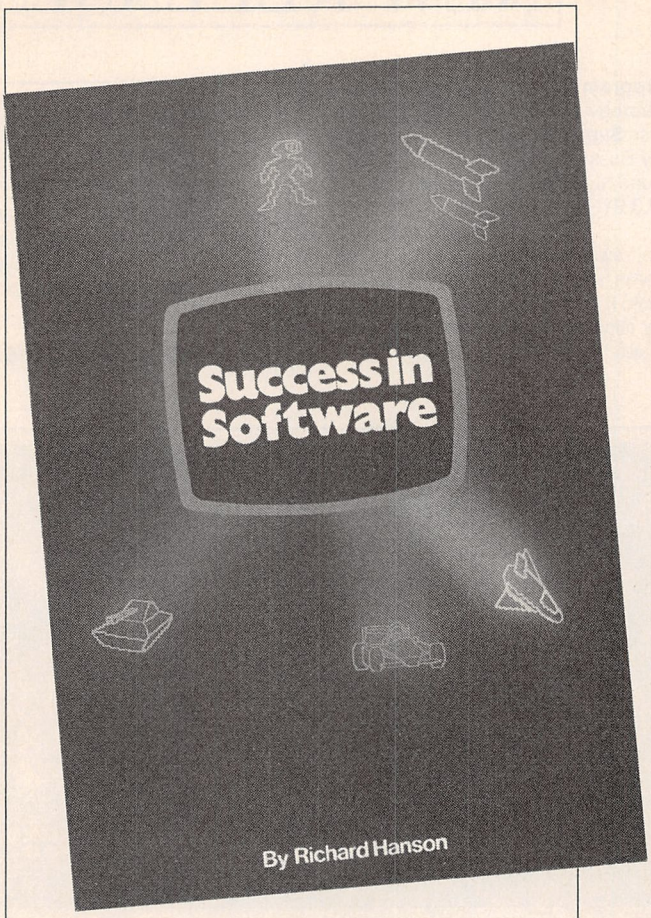
The movements are all fairly standard for this sort of game; high kicks, low kicks, block, jump, etc. Hamster responds to joystick and keyboard control smoothly enough and your opponents collapse with a gratifying squeak, but the graphics are a bit rough.

Attribute problems are always a problem with the Spectrum but they can be tidied up a bit more than they have here. When you and your opponent stand right in front of each other their figures become a complete blur. Also, when Hamster faces right and makes a low-kick he shouts "Hyah!!". If you make the same move while facing left he shouts "!!Hayh", which seems to indicate a certain lack of attention paid to the graphics.

If you've got some sort of furry animal fetish then *Ninja Hamster* might be your cup of tea, but it's by no means one of the best kung-fu games around at the moment.

Cliff Joseph

Program *Ninja Hamster* **Type** Martial Arts **Micro** Spectrum **Price** £7.95 tape, £14.95 disc **Supplier** CRL, CRL House, 9 King's Yard, Carpenter's Road, London E15 2HD.



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Or Tel: 01-278 2377

◀ continued from page 43

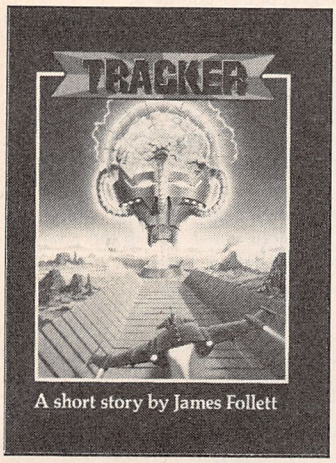
An upgraded version of EA's excellent graphics package. New features include a Perspective facility which allows you to rotate any object in three dimensions in order to create perspective graphics. It's not cheap, but it's probably the best graphics utility currently available for the Amiga.

IBM PC and Compatibles

Program *Lords of Conquest* **Type** Strategy **Price** £14.95 **Supplier** Electronic Arts, Langley Business Centre, 11–49 Station Road, Langley, Nr Slough, Berks SL3 8YN.

Program *Tracker* **Type** Strategy **Price** £19.95 **Supplier** Rainbird, 64–76 New Oxford Street, London WC1A 1PS.

IBM version of Rainbird's complex strategy game (and yes, it is strategy despite the arcade sequences).



Program *World Tour Golf* **Type** Sports simulation **Price** £19.95 **Supplier** Electronic Arts, Langley Business Centre, 11–49 Station Road, Langley, Nr Slough, Berks SL3 8YN.

Sinclair QL

Program *QL TurboQuill* **Type** Application **Price** £13.50 microdrive or 3½ inch disc **Supplier** Athene Consultants, 33 Holly Grove, Fareham, Hants PO16 7UP.

A program designed for use with QL *Quill*, which speeds up the text handling considerably, as well as adding some new functions.

Spectrum

Program *Word Master* **Type** Application **Price** £14.95 **Supplier** Cardex, 11 Marsh Street, Barrow in Furness, Cumbria LA14 2AE.

A wordprocessor with some simple graphics and multiple file handling facilities.

Program *The Calling* **Type** Adventure **Price** £1.99 (mail order only) **Supplier** Visual Dimensions, 59 Nunnery Lane, York YO2 1AH.

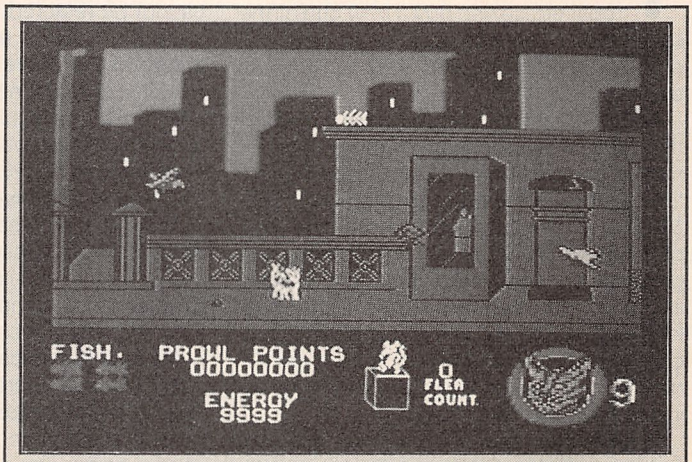
A budget adventure from a new, small software house. Set in a mysterious mansion, the game has a few rough edges but is otherwise quite professional and well worth £1.99. There's even an enhanced 128 version on one side of the tape. Visual Dimensions is currently looking for a major software house to market its games, so if anyone out there is interested drop them a line (and tell them *Popular* sent you).

Program *Bounces* **Type** Arcade **Price** £1.99 **Supplier** Firebird, 64–76 New Oxford Street, London WC1A 1PS.

An old Beyond title now re-released as a budget game. It's a sort of futuristic squash game for two players, both of whom are tied to the walls of the court by elastic rope. It's not easy to master, but it does make excellent value for £1.99.

Program *Samurai Trilogy* **Type** Arcade **Price** £7.99 **Supplier** Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS.

For some reason there's been a rush of martial arts games recently. This one offers a bit of variety by giving you three different martial skills to master, but I can't help thinking that few of these games have really gone any further than good old *Exploding Fist*.



Despite being assaulted by some of the worst poetry I've ever had to wade through in the instructions for this game I persevered and loaded it up. And, *On The Tiles* turned out to be pretty good fun.

The simplest way of describing it is to call it a kind of feline shoot 'em up. You play the part of a wild alley cat who is out to gain control of his territory. You do this by prowling the streets and searching out fish bones, and by tackling the other animals that are around.

The worst of these are the "kitty hawks" that come swooping down from the skies and are instantly fatal if they touch you. The hedgehogs are deadly too, whilst frogs and fleas just drain energy (ten fleas and you lose one of your nine lives). And occasionally you'll get a boot chucked at you from a window, or meet up with another cat who's looking for a fight.

Like any alley cat worth its salt you can leap on to convenient railings, window ledges, and so on, and spit nasty green stuff which will despatch the other wildlife. A minor irritation is the way that the kitty hawks will sometimes fly on from one side of the screen before you can do anything about them, or they'll swoop down from an angle that doesn't allow you to spit at them. This can cost you a few lost lives, but otherwise the game plays very well. The animation of the cat is excellent as it runs and jumps through the streets, my only quibble being that you can't turn and change direction as fast as I'd like.

This can also cause a lot of lost lives but to make up for that there are occasional bouts of invulnerability (though I've no idea what causes these, and there's no mention of it in the instructions). The positions of the fish bones and the paths to them are fixed, which may mean that the game will lack variety over a long period, but it does make a nice change from flying spaceships past hordes of aliens (even if the principle is the same).

Cliff Joseph

Program *On The Tiles* **Type** Arcade **Micro** C64 **Price** £7.95 tape, £12.95 disc **Supplier** Firebird, 64–76 New Oxford Street, London WC1A 1PS.

CHARTS

Top Twenty

1	(1)	Milk Race	Mastertronic
2	(6)	Paperboy	Elite
3	(14)	Super Robin Hood	Code Masters
4	(4)	Run for Gold	Alternative
5	(2)	BMX Simulator	Code Masters
6	(11)	Cricket International	Alternative
7	(5)	Exolon	Hewson
8	(8)	Destructo	Bulldog
9	(18)	Avenger	Gremlin Graphics
10	(7)	Barbarian	Palace
11	(3)	Road Runner	US Gold
12	(15)	Back to the Future	Firebird
13	(–)	Four Great Games	Micro Value
14	(–)	Wizball	Ocean
15	(9)	Kik Start 2	Mastertronic
16	(–)	Nick Faldo's Open Golf	BugByte
17	(16)	Football Manager	Addictive
18	(–)	ACE 2	Cascade
19	(10)	The Last Ninja	System 3
20	(–)	River Raid	Firebird

All figures compiled by Gallup/Computer Trade Weekly

ZIGGURAT

Permanent storage of the future

Your computer has just broken. You find it is uneconomic to have it repaired, so you buy a new one of the same type. You can load in all your old programs and data, and they run just as before.

Some American scientists have related this idea to a prospect of immortality for human beings. According to Albert Rosenfield, writing in *Prolongevity II* (knopf, 1985, $19.00), Professor Bernard Strehler has proposed a machine for downloading the program and data from the human brain into a durable medium, where it would be kept until such time as a replacement body can be made. This idea has re-appeared in other futurist books and gives a new meaning to the word *downloading.*

In *Scientific and Engineering Problem Solving with the Computer,* Professor William Bennett suggests that the brain of a creative artist could be modelled by a "sieve" into which is fed random noise, and outputs words. A simple experiment, performed as an example to the programming techniques that the book aims to teach, examines how a three level sieve set up from a Shakespeare play can produce vaguely Shakespeare-like English. Obviously it left a great deal to the imagination, but Professor Bennett speculated as to what higher level sieves could produce.

However, to be honest, no one really has the slightest idea as to how to record the program and data from the human brain. The trouble is that we have not evolved cassette ports or optical disc interfaces!

All is not lost, though, as a Michigan University professor has another idea. That is to freeze the entire remains of a dead person in liquid nitrogen. In the future, argues Professor Robert Ettinger, it should be possible to obtain the 'program and data' from the dead brain even if it itself cannot be restored to life.

As the brain is essentially a chemically operated unit, there could well be chemical remains of memories. These remains may only be of molecular size, but molecular sized machines could recover them. This is suggested in Eric K Drexler's book *Engines of Creation* (Doubleday 1986).

The MIT professor provides a logical pathway from present day technology to one where molecular sized machines can be used to compute and to fabricate anything from rocket motors to replacement human bodies.

In California, there are organisations that freeze just the heads of dead people, on the basis that it is uneconomic to retain the rest of the body. Their charge for the whole body is three times as much as for the head only. Professor Ettinger is unwilling to offer heads only or *neuropreservation* on public relations grounds, but his charges are only a third of the Californians' as he places greater reliance on future recovery ability. Also, he is unable to offer services to anyone outside of his own locality unless they have their remains delivered there.

One of the Californian organisations, Alcor, is represented in the UK by Mizar Ltd. Readers may have seen Mizar's president, Mr Max O'Connor, being interviewed by Terry Wogan recently, and he has also appeared with Frank Bough on *BBC Breakfast Time.* There will be a future episode of *Where There's Life* on cryonic suspension, as the process is known. In the Midlands, there was a whole hour's programme on the subject in *Donohoe,* and there has been press coverage.

John de Rivaz

PUZZLE

Puzzle No 274

Professor Otto Hex was addressing his Friday afternoon class.

"A little problem for you to solve over the weekend," he announced. "In this alphamatic, we have a simple multiplication, but I have indicated an odd number with an 'O' and an even number with an 'E', so you see – nothing could be simpler. Of course, the O's do not infer that it is the *same* odd number digit that is used, and similarly it is not necessarily the same even digit (and you may include zero as an even number)."

```
      O E O
        O E
    -------
O E O x
  O E x x
---------
E O E O E
```

Unfortunately, three of the letters (as indicated by the x's) were so badly written that it was impossible to decide if they were E's or O's, and the Professor had swept up his papers and had departed.

However, it should still be possible to work out the actual sum.

Solution to Puzzle No 269

The smallest triangle which can be divided in exactly four ways is one with 24,531 counters, with a side length of 221 counters.

This can be split into the following four small triangles:

1953 (62) and 22578 (212)
3003 (77) and 21528 (207)
7140 (119) and 17391 (186)
8778 (132) and 15753 (177)

While there are smaller triangles which will divide more than four ways, this is the smallest which will split exactly four times.

```
20 CLS:t=0
30 FOR L=1 TO 500:IF ct=4 THEN STOP
40 ct=0:PRINT:PRINT:PRINT "L =";L;"  ";
50 t=t+L
60 t1=0:FOR L1=1 TO L-1
70 t1=t1+L1
80 IF t1>t/2 THEN 160
90 t2=t1::FOR L2=L1+1 TO L-1
100 t2=t2+L2:t12=t1+t2
110 IF t12>t THEN 150
120 IF t12<>t THEN 140
125 IF ct=0 THEN PRINT"T =";t
130 PRINT"L1 =";L1;", L2 =";L2;"****
T1 =";t1;", T2 =";t2:ct=ct+1
140 NEXT L2
150 NEXT L1
160 NEXT L:END
```

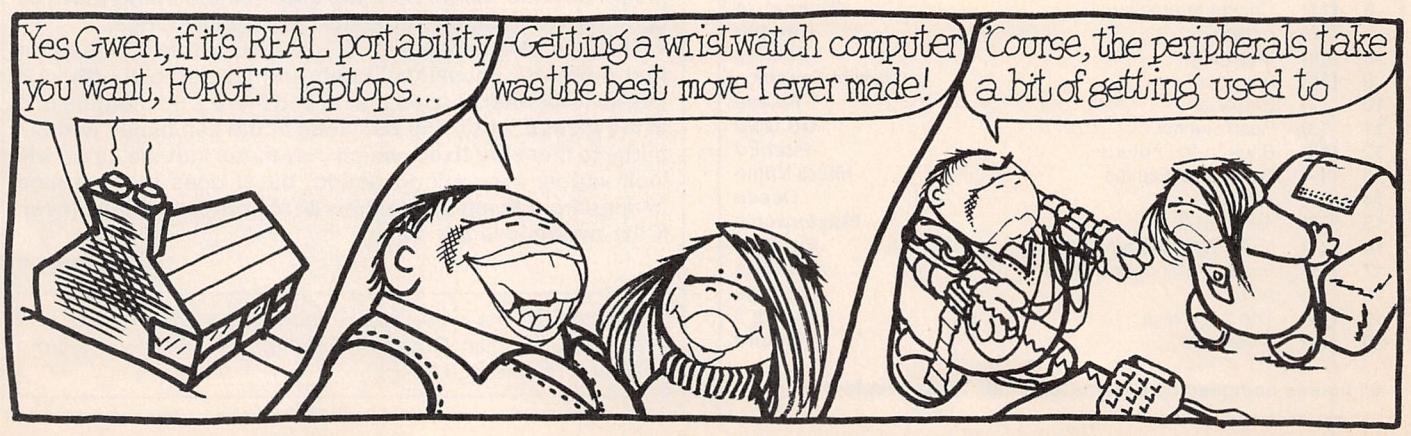
Winner of Puzzle No 269

This week's winner is M W Peters, of Blandford, Dorset, who will receive £10.

Rules

The closing date for Puzzle 274 is September 30.

HACKERS



NEW LOW PRICE ST!

ONLY FROM SILICA

Finally, there's a personal computer that not only solves problems like other computers, but also solves the one problem that other computers have created. Affordability. Silica Shop are pleased to present the ST range of personal/business computers from Atari. The ST was designed utilizing the most recent breakthroughs in semiconductor technology, producing a personal computer that performs tasks with fewer parts. Which means it costs less to make. And less to buy. The latest ST computers now include built in power supplies and built in disk drives. The TOS operating system and GEM window environment are now on ROM chips which are already installed in the ST keyboard. This enables automatic instant booting when you switch on. Silica Shop are pleased to offer the complete Atari ST range. Our mail order department is situated in Sidcup and we have 3 retail outlets at Sidcup, Lion House (Tottenham Court Rd) and Selfridges (Oxford Street). We have eight years experience of Atari products, longer than any other UK company, and are well established as the UK's No.1 Atari specialist. With a group turnover of over £9 million and in excess of 80 staff, we offer you unbeatable service and support. We provide several facilities which you will find invaluable during your Atari computing life and most of these facilities are available **ONLY FROM SILICA**. We suggest that you read through what we have to offer, before you decide where to purchase your Atari ST.

FREE STARTER KIT - Only From Silica

When you purchase any Atari ST keyboard, you will not only receive the best value for money computer on the market, but you will also receive the following from Atari Corporation as part of the package:

** BASIC Language Disk * BASIC Manual * ST Owners Manual * TOS/GEM on ROM*

If you buy your ST from Silica Shop, you will also receive:

** NEOchrome Sampler - colour graphics program * 1st Word - Word Processor*

In addition, we at Silica would like to see you get off to a flying start with your new computer, so we have put together a special **ST STARTER KIT** worth over £100, which we are giving away **FREE OF CHARGE** with every ST computer purchased at our normal retail prices. This kit is available **ONLY FROM SILICA** and is aimed at providing users with a valuable introduction to the world of computing. We are continually upgrading the ST Starter Kit, which contains public domain and other licensed software, as well as books, magazines and accessories all relevant to ST computing. Return the coupon below for full details.

DEDICATED SERVICING - Only From Silica

At Silica Shop, we have a dedicated service department of seven full time Atari trained technical staff. This team is totally dedicated to servicing Atari computer products. Their accumulated knowledge, skill and experience makes them second to none in their field. You can be sure that any work carried out by them is of the highest standard. A standard of servicing which we believe you will find **ONLY FROM SILICA**. In addition to providing full servicing facilities for Atari ST computers (both in and out of warranty), our team is also able to offer memory and modulator upgrades to ST computers.

1Mb RAM UPGRADE: Our upgrade on the standard Atari 520ST-M or 520ST-FM keyboard will increase the memory from 512K to a massive 1024K. It has a full 1 year warranty and is available from Silica at an additional retail price of only £86.96 (+VAT = £100).

TV MODULATOR UPGRADE: Silica can upgrade the 1040ST-F to include a TV modulator so that you can then use it with your TV set. This is an internal upgrade and does not involve any untidy external boxes. A cable to connect your ST to any domestic TV is included in the price of the upgrade which is only £49 (inc VAT). The upgrade is also available for early 520ST computers at the same price.

THE FULL STOCK RANGE - Only From Silica

We aim to keep stocks of all Atari related products and our warehouse carries a stock of over £½ million. We import many software titles direct from the USA and you will find that we have new releases in advance of many of our competitors. Unlike dealers who may only stock selected titles, we have the full range. In addition, we carry a complete line of all books which have been written about the Atari ST. A range as wide as ours is something you will find is available **ONLY FROM SILICA.**

AFTER SALES SUPPORT - Only From Silica

Rest assured that when you buy your ST from Silica Shop, you will be fully supported. Our free mailings give news of releases and developments. This will help to keep you up to date with new software releases as well as what's happening in the Atari market. And in addition, our sales staff are at the end of a telephone line to service all of your Atari requirements. If you purchase an ST from Silica and would like any technical advice, we have a full time technical support team to help you get the best from your computer. Because we have both the staff and the systems specifically dedicated to providing after sales service on Atari ST computers, we are confident that our users enjoy an exceptionally high level of support. This can be received **ONLY FROM SILICA.**

FREE CATALOGUES - Only From Silica

At Silica Shop, we recognise that serious users require an in-depth information service, which is why we mail free newsletters and price lists to our ST owners. These are up to 48 pages long and are crammed with technical details as well as special offers and product descriptions. If you have already purchased an ST and would like to have your name added to our mailing list, please complete the coupon & return it to us. This information service is available **ONLY FROM SILICA.**

FREE OVERNIGHT DELIVERY - From Silica

Most orders are processed through our computer within 24 hours of receiving them. Most hardware orders are sent by the overnight GROUP 4 courier service FREE OF CHARGE to customers within the UK. This method helps to ensure minimum delay and maximum protection.

PRICE MATCH - Only From Silica

We hope that the combination of our low prices, FREE UK delivery service, FREE Starter Kit and FREE after sales support, will be enough to make you buy your Atari equipment from Silica Shop. If however, there is something you wish to purchase, and you find one of our competitors offering it at a lower price, then please contact our sales department, providing us with our competitor's name, address and telephone number. If our competitor has the goods in stock, we will normally match the offer (on a 'same product - same price' basis) and still provide you with our normal free delivery. We realise that we are not the only company who will match a competitor's price. However, if you come to us for a price match, you will also be entitled to our after sales service, including free newsletters and technical support. This makes our price match promise rather special, something you will receive **ONLY FROM SILICA.** We don't want you to go anywhere else for your Atari products. So shop at Silica, the UK's No1 Atari Specialist.

SIDCUP (& Mail Order) **01-309 1111**
1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

LONDON **01-580 4839**
Lion House (1st floor), 227 Tottenham Court Rd, London, W1P OHX

LONDON ..... **01-629 1234 ext 3914**
Selfridges (1st floor), Oxford Street, London, W1A 1AB

£260 +VAT=£299

SO MUCH FOR SO LITTLE!

There is nothing that can compare with the incredible value for money offered by Atari's 520ST-FM. For only £260 (+VAT=£299), you can purchase a powerful 512K RAM computer, with a 95 key keyboard (including numeric keypad), MIDI interface, GEM, a palette of 512 colours, mouse controller, and a 512K built-in disk drive. The 520ST-FM has a TV modulator built-in, and comes with a lead to allow you to plug it straight into any domestic colour television set. The mains transformer is also built-in to the keyboard, so there are no messy external boxes. You couldn't wish for a more compact, powerful and stylish unit. Atari ST computers are now firmly established in the UK, there are nearly 500 software titles already available for a wide variety of applications and the list is growing all the time. And that's not all. When you buy your new 520ST-FM (or any Atari ST computer) from Silica Shop, you will get a lot more, including a FREE Silica ST Starter Kit worth over £100. Read the ONLY FROM SILICA section on the left, to see why you should buy your new high power, low price 520ST-FM from Silica Shop, the UK's No1 Atari Specialists. For further details of the range of Atari ST computers and the FREE Silica ST Starter Kit, complete and return the reply coupon below.

ATARI 520ST-FM NOW ONLY £260 (+VAT=£299)

520ST-FM with 512K RAM & mono monitor £399 (inc VAT) **Upgrade from 512K RAM to 1024K RAM £100** (inc VAT)

ATARI 1040ST-F - NEW PRICE

We are pleased to announce a new reduced price point on the 1040ST-F which is now available for only £499 (inc VAT). The 1040 is a powerful computer with 1Mb of RAM and also includes a built-in 1Mb double sided 3½" disk drive. The 1040 has been designed for use on business and professional applications most of which require a high resolution monochrome or colour monitor. It does not therefore have an RF modulator for use with a domestic TV set. Modulators can be fitted for £49 (inc VAT).

1040ST-F Keyboard Without Monitor ..... £499 (inc VAT)
1040ST-F Keyboard + High Res SM125 Mono Monitor ..... £599 (inc VAT)

If you would like further details of the 1040ST-F, return the coupon below.

MEGA ST's NOW IN STOCK

For the user who requires even more RAM than the 520 or 1040 ST's offer, the new MEGA ST computers are now available. There are two MEGA ST's, one with 2Mb of RAM and the other with a massive 4Mb. Both new computers are fully compatible with existing ST's and run currently available ST software. The MEGA ST's are styled as an expandable Central Processing Unit with open architecture and a detachable keyboard. They are supplied with GEM, a free mouse controller and all extras as with the 520 or 1040. Prices are as follows:

MEGA ST 2Mb Keyboard + CPU ..... £899 (inc VAT)
MEGA ST 2Mb Keyboard + CPU + SM125 Mono Monitor ..... £999 (inc VAT)
MEGA ST 4Mb Keyboard + CPU ..... £1199 (inc VAT)
MEGA ST 4Mb Keyboard + CPU + SM125 Mono Monitor ..... £1299 (inc VAT)

If you would like further details of the MEGA ST's, return the coupon below.

ATARI ST

To: Silica Shop Ltd, Dept PCWK 1087, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

PLEASE SEND ME FREE LITERATURE ON THE ATARI ST

Mr/Mrs/Ms: ..... **Initials:** ..... **Surname:** .....

Address: .....

.....

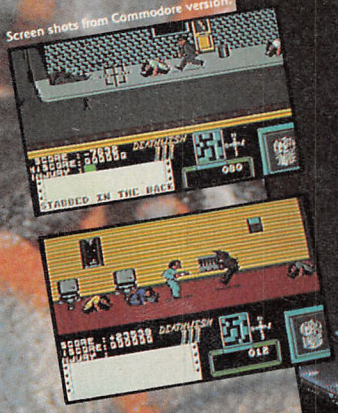
.....

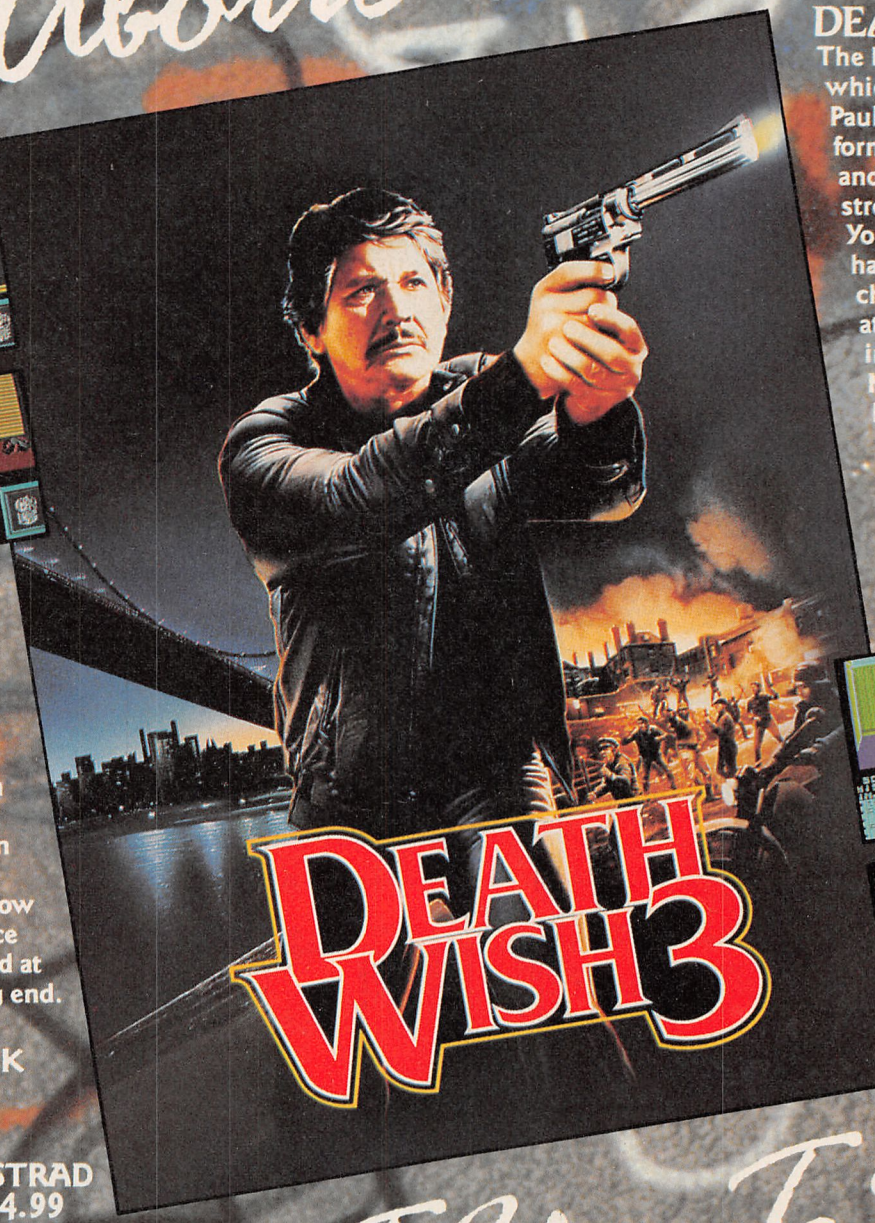
..... **Postcode:** .....

Do you already own a computer If so, which one do you own? .....

New York's Scum Are About To Take Over

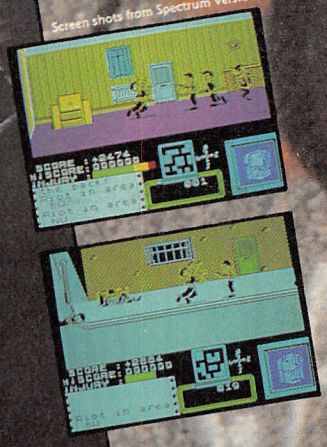
Screen shots from Commodore version.





DEATH WISH 3 .....
The big screen classic, in which modern day vigilante Paul Kersey wreaks his own form of revenge on the scum and filth that terrorise the streets of modern day New York. For too long the gangs have run wild, un-challenged in their peverted attacks and violations of innocent citizens. Muggings and robberies have become a daily feature of city life. So when the chief of police turns a blind eye you decide to take over where the law left off.

Screen shots from Spectrum version.



Strap on your famous 475 WILDEY MAGNUM, turn yourself into a one man fighting force armed with pump action shotgun, machine gun and rocket launcher. Now turn the tables on the punks and creeps who certainly know how to dish out the violence but may not be so good at being on the receiving end.

SPECTRUM 48/128K
Cassette £7.99
MSX Cassette £7.99
CBM 64/128 & AMSTRAD
Cassette £9.99 Disk £14.99

It's Down To You To Stop Them... You Are Bronson

Gremlin Graphics Software Limited, Alpha House, 10 Carver Street, Sheffield S1 4FS. Tel: 0742 753423

GREMLIN

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